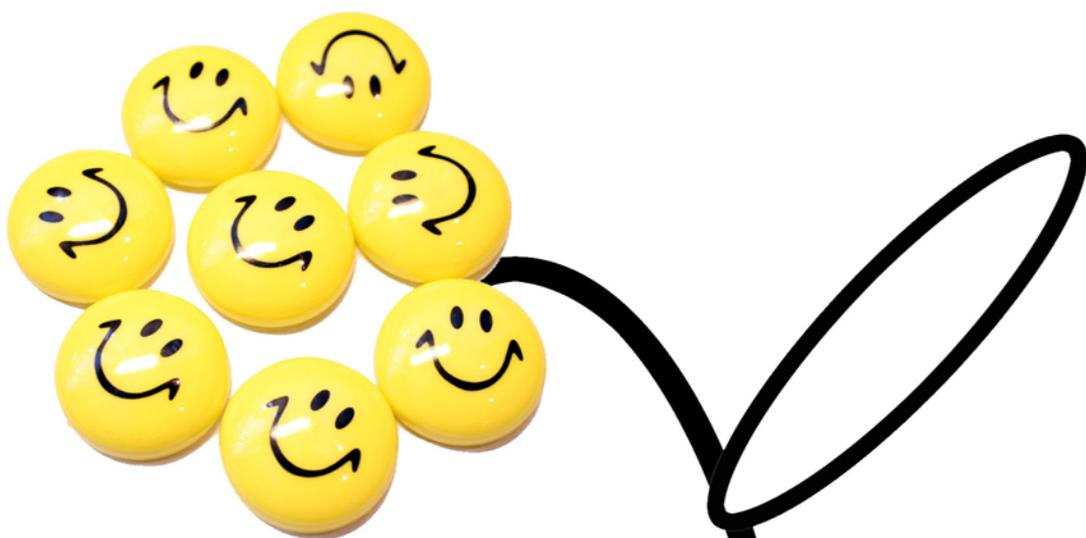


*Psychology of Emotions, Motivations and Actions*

# PSYCHOLOGY OF OPTIMISM



Phyllis R. Brandt  
Editor

NOVA





**PSYCHOLOGY OF EMOTIONS, MOTIVATIONS AND ACTIONS**

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# **PSYCHOLOGY OF OPTIMISM**

**PHYLLIS R. BRANDT**  
**EDITOR**



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**Nova Science Publishers, Inc.**

*New York*

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## PREFACE

Optimism can be defined as positive generalized outcome expectancies and has been shown to act as a protective factor against somatic and mental health problems. Numerous studies report an association between optimism and enhanced coping strategies, lower levels of distress and depression, lower risk of mortality, slower disease progression, and better psychological adjustment to a diagnosis and treatment of a severe disorder. Although these findings indicate an important role of optimism on well-being, very little is known about the origins of individual differences in optimism. This new book presents research in the study of optimism including the relationship between dispositional optimism and musculoskeletal pain, the phenomenological and statistical relationships between optimism and sense of coherence and self-efficacy and genetic influences on optimism and mental health.

Chapter 1 - Throughout the world, musculoskeletal disorders are a leading cause of chronic disease morbidity, and chronic musculoskeletal pain affects many millions of people. Moreover, chronic musculoskeletal pain impacts negatively on physical health in several ways. This chapter is an exploration of the relationship between optimism, quality of life and pain among patients suffering from chronic musculoskeletal pain. Unlike studies that have typically focused on the impact of pain in health related quality of life, the current study focused on how dispositional optimism influences patients' health-related quality of life and pain intensity. Also, results from a study of 267 nurses are discussed too. Participants completed a battery of questionnaires including a measure of optimism, one for health related quality of life and a pain meter. Analysis showed that optimism had a significant negative correlation with pain intensity. Results indicated that dispositional optimism was a significant

predictor of both physical and mental components of the quality of life measurement.

Chapter 2 - The aim of this chapter is to present optimism as a core component of positive health attitudes (PHA). This chapter describes, explores and explains the phenomenological and statistical relationships between optimism (O) and other health related constructs such as sense of coherence (SOC) and self-efficacy (SE). Four reliable and validated research tools were used to collect the data and also served as variables to operationalize PHA, namely Antonovsky's Sense of Coherence Questionnaire (SOC-29); Schwarzer & Jerusalem's Generalised Self-Efficacy Scale, (GSES), Health Behavior Inventory (HBI) and Seligman's Scale (SS). As a consequence, optimism's role and dynamics within PHA have been conceptualized. The following statistical procedures have been used: cluster analysis, REGW-Q test and Pearson's correlation ratio. The results indicate statistically significant differences ( $p < 0.001$ ) between these four variables/constructs: for example, from the statistical point of view it was concluded that the higher the level of optimism the better beliefs in SE.

A qualitative-hermeneutical approach to data analysis has been used. The interpretative-phenomenological perspective provides an effective positive self-explanation style in order to symbolize, learn from others, plan alternative strategies, regulate individuals' motivation (through goal aiming notion and one's positive health expectations), behaviour and mood. It is argued that high O may affect one's self-reflection, essential for producing enduring cognitive-emotional change. Furthermore, a high O results in greater control over thoughts, feeling and actions, stress coping strategies, health behaviors and emotional well-being. Also, it has been proposed that increased O along with SOC may lead to an enhanced 'behavioural immunology' that leads to better health. A combined essence of these two models may lead to the situation in which stimuli from the outside and inside worlds have a more logical structure that can be predicted and explained, i.e. a global orientation that creates dynamic and persistent self-beliefs may be developed. All the research results from REGWQ tests, Pearson's correlation coefficient, cluster analysis and qualitative methods of data analysis suggest the existence of conceptual similarities between O, HB, SOC and SE and a new empirical-theoretical pattern. This pattern will further be discussed and developed.

Chapter 3 - Optimism can be defined as positive generalized outcome expectancies and has been shown to act as a protective factor against somatic and mental health problems. Numerous studies report an association between optimism and enhanced coping strategies, lower levels of distress and

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depression, lower risk of mortality, slower disease progression, and better psychological adjustment to a diagnosis and treatment of a severe disorder. Although these findings indicate an important role of optimism on well-being, very little is known about the origins of individual differences in optimism. Due to its predictive value for well-being, happiness, life-satisfaction, and mental and somatic health, optimism merits special attention. Especially from a public health perspective it is attractive to explore the construct of optimism and its relationship to health in order to possibly develop positivity enhancing intervention. It has been proposed that positive and negative experiences throughout childhood and adolescence influence an individual's optimism level. However, more and more studies find that genetic factors may play a significant role in personality traits such as optimism. To date few studies have investigated the genetic and environmental influences on variation in optimism, most of these studies using a very small sample size. Here the authors review the literature exploring the genetic architecture of optimism and its' covariation with health variables. Additionally, the authors extend our recent investigations of optimism in an Australian Twin Sample (Mosing et al. 2009) by examining the relationship between neuroticism, optimism, and mental health, in order to better clarify the relationship between optimism and health.

Chapter 4 - This chapter attempts to review and scrutinize the optimism concept and share these issues and evaluations with the readers. Although this chapter focuses on optimism mainly, it sometimes also refers to pessimism. Although the optimism phenomenon has a positive connotation, this construct has the potential to take different forms. Therefore, the changing characteristics of optimism according to time, situations, conditions and culture is emphasized. The benefits and deficits of optimism are discussed in terms of dispositional optimism, comparative optimism, unrealistic optimism, defensive pessimism and unrealistic pessimism by reviewing the studies about psychological well-being, physical well-being, academic life and life difficulties. Especially, the importance and vitality of carrying out studies sensitive to cultural differences is emphasized.

A room in the oncology department of a hospital... Two adult male patients, with the same diagnosis share the room... One of them, Daniel, is very anxious about the prognosis of his illness and frequently asks the doctors and the nurses about his condition and checks his test results — even though he does not understand much about them. He spends sleepless nights worrying about how his wife and children will cope with their lives without him. Meanwhile the other patient, Tom, is not interested in the prognosis of his

illness, though he had spent a considerable amount of time at the hospital. He often talks about himself as being a strong man and believes that any trouble sent by the Lord will be dealt with by Him.

Chapter 5 - Many previous studies suggest that optimism (that is, a generalized positive expectancy of the future) is related to better health outcomes, more adaptive coping, and health behaviors. These relationships may have a mutual reinforcing nature. In this study primarily the authors focus on the health protective nature of optimism in adolescence. In addition, while the health protecting effects of optimism have been already justified, we know much less about the background variables (such as parent – child relationship or socioeconomic status and school-related factors) influencing adolescent dispositional optimism. Previous findings suggest that some social factors, particularly social support may be positively related to optimism. Thus, in the first part of this study, the authors have examined which social variables of the two major contexts of socialization (family and school) predict optimism. Many investigations revealed that optimism was positively associated with positive health outcomes such as mental health and quality of life. Thus, in the second part of our research we have concentrated on detecting associations between optimism and a set of health variables, namely, depression, self-perceived health (SPH), satisfaction with life (SWL) and substance use, such as alcohol consumption, smoking, and drug use. 881 secondary school students in Szeged, Hungary completed a battery of questionnaires that contained items on optimism (measured by the Life Orientation Test, LOT), health-compromising and health-enhancing behaviors as well as family and school-related protective factors. Results indicated that different forms of family support, parents' schooling, socioeconomic status (SES), and being happy with school significantly but slightly predicted optimism. Furthermore, optimism was positively correlated with satisfaction with life and self-perceived health and negatively with depression. In terms of substance use, optimism proved to be a protective factor against adolescent substance use except for smoking. In addition optimism was also a significant predictor of adolescent regular physical activity and diet control. The authors may conclude that findings support a mutual, reinforcing relationship between optimism and positive health outcomes. The negative correlation between optimism and depression is in consonance with previous results demonstrating the stress buffering nature of optimism in adolescent life. These findings are discussed in the light of the health protective power of optimism.

Chapter 6 - Some studies showed that unrealistic optimism, the tendency to believe that one's risk is less than that of one's peers, is reduced when

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people have personal experience with an event. Nevertheless, in the area of driving, this impact of prior experience appears to be unsystematic. This inconsistency could be due to a dimension that was not taken into account, namely the legal personal responsibility involved. Someone who has been victim of an accident for which he was not declared legally responsible may continue to be unrealistically optimistic contrary to someone declared legally responsible. To examine this hypothesis, the authors compared drivers that have had no accident with drivers that had been involved in minor car accident for which they were, or were not, legally responsible. All participants were asked to evaluate the likelihood of being confronted with two risks (accident involving car damages and accident involving physical injury), in comparison to the average driver. Results from this study suggest that in the area of driving, legal responsibility is a stronger determinant of unrealistic optimism reduction than simple prior experience of an accident does and that this impact is risk specific.

Chapter 7 - Comparative Optimism (CO), the tendency to think that one will experience more positive and fewer negative events than others (Weinstein, 1980), has been largely demonstrated. Within the different theories posited for CO, the fact that it could result from a conscious strategy of self-presentation has only been superficially explored. However, indirect data support this hypothesis. First, when people are explicitly asked to compare themselves to others, they often express more CO than when they have to evaluate separately their own risk and their peer's one (Perloff & Fetzer, 1986; Spitzstetter, 2003). Secondly, studies using the judge-paradigm show that CO is a socially valued phenomenon since a person who displays CO compared to more pessimism will be judged more positively by the peers (Helweg-Larsen, Sadeghian & Webb, 2002).

Thus, it was interesting to test if people are self-aware of this socially valued dimension of CO when they are asked to evaluate their own risks. In other words, using the self-presentational paradigm (Jellison & Green, 1981) we tested if CO could result, at least partially, from a self-presentation motivation.

Participants had to complete a questionnaire in which they had to evaluate their risk of being confronted with nine negative events (e.g. car accident) either on a direct or an indirect scale. They were told to complete the questionnaire spontaneously or with the aim to convey a favorable (*vs* unfavorable) impression of themselves. The authors postulated that if CO results from a self-presentation motivation, CO would be reinforced by

explicit comparison and the spontaneous evaluation would be equivalent to the evaluation elicited by the favorable impression condition.

Results show that a comparable level of CO is present whenever participants have to depict themselves positively or to answer spontaneously. Moreover, in these conditions the direct method elicits more CO than the indirect one. On the other hand, no CO has been detected when participants have to depict themselves negatively. In this case, participants displayed rather « realism » (same risk as the comparison target) when the direct method is used.

Our results demonstrate that CO can be, at least partially, explained by a presentational motivation. People obviously evince normative perspicacity (Py & Somat, 1991), modulating consciously their CO according to the social environmental constraints.

Chapter 8 - This commentary reviews recent evidence that optimism is the result of emotional processes. The emotional basis of optimism appears to be part of a motivational system that typically functions quite well and allows people to identify the goals they want to pursue and situations they want to avoid. Sometimes, though, unjustified optimism can lead people to take excessive risks or fail to protect themselves from harm. Therefore, understanding the causes of optimism and identifying ways to reduce optimism when needed has implications for the quality and length of human lives. Recent research provides compelling evidence that optimism results when people have positive or negative affective reactions to a potential future event. Although optimism results from these automatic and emotional processes, analytic resources can be deployed to reduce optimism when people have an intense emotional reaction or when they are encouraged to use emotion regulation strategies. This commentary includes discussions of 1) the relationship between emotional reactions and optimistic judgments and how this relationship is impacted by a number of individual and situational factors, 2) the implications of this process for attempts to reduce optimism to encourage more realistic judgments, and 3) the implications of this process for health, wealth, and well-being.

Chapter 9 - The tendency to believe that the future will be consistent with desires is perhaps the best documented bias that influences human thought. Despite decades of research on this desirability bias, very few studies have addressed what is meant by desire or how desires influence judgments about the future. The goal of this chapter is to provide a novel theoretical framework from which to understand why and when people are optimistic about the future and to report results from three studies that examined whether the desirability

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of future events changes how people evaluate objective probabilities about the likelihood of those events. Two studies examined the influence of desire on the use of probabilistic information in judgments about the likelihood of future life events (such as winning awards, developing cancer) and judgments about chance events (winning a game, losing a game). A third study explored whether people use probabilistic information differently when they make judgments about their own future versus the futures of others. Consistent with predictions based on a dual process framework, people judged that positive events were more likely to occur than negative events with the exact same objective probability of occurrence and they interpreted probabilistic information more loosely when they made judgments about their own futures versus the futures of others. These findings suggest that people take remarkable liberties with supposedly objective information in order to judge that their own future will be ideal.



*Chapter 1*

**RELATIONSHIP BETWEEN DISPOSITIONAL  
OPTIMISM AND MUSCULOSKELETAL PAIN:  
AN ANALYSIS OF THE ROLE OF OPTIMISM IN  
HEALTH RELATED QUALITY OF LIFE  
AMONG HEALTH CARE PROFESSIONALS  
WITH MUSCULOSKELETAL PAIN**

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**ABSTRACT**

Throughout the world, musculoskeletal disorders are a leading cause of chronic disease morbidity, and chronic musculoskeletal pain affects many millions of people. Moreover, chronic musculoskeletal pain impacts negatively on physical health in several ways. This chapter is an exploration of the relationship between optimism, quality of life and pain among patients suffering from chronic musculoskeletal pain. Unlike studies that have typically focused on the impact of pain in health related

quality of life, the current study focused on how dispositional optimism influences patients' health-related quality of life and pain intensity. Also, results from a study of 267 nurses are discussed too. Participants completed a battery of questionnaires including a measure of optimism, one for health related quality of life and a pain meter. Analysis showed that optimism had a significant negative correlation with pain intensity. Results indicated that dispositional optimism was a significant predictor of both physical and mental components of the quality of life measurement.

## INTRODUCTION

In 1948, the World Health Organization (WHO) Constitution defined health as 'a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity'. Physical, mental, and social health status of an individual are interrelated, although the strength and causal nature of their relationships have not been well documented. Evidence presents that poor physical health can interfere with emotional health, while mental illness and disorders such as depression or anxiety can contribute to poor physical condition (Zautra & Smith, 2001). Both physical and mental disorders are strongly associated with poor social and economic outcomes for individuals (Berkman & Syme, 1979; Aro et al., 2001).

Throughout the world, musculoskeletal disorders are a leading cause of chronic disease morbidity. Research, based on the increasing numbers of elderly worldwide and prolonged average life expectancy, shows that the prevalence of these conditions is expected to rise dramatically (Woolf & Pfleger, 2003; Woolf et al., 2004). Many musculoskeletal conditions produce severe long-term pain. It is well known that prolonged untreated or under-treated chronic pain can have significant negative physical, psychological and social effects and can also have a disruptive impact on an individual's daily life. Assessment of health-related quality of life (HRQoL) provides a way for clinicians and psychologists to better understand the effect of this chronic condition on the overall well-being. In addition, the assessment of physical, mental, and social health are necessary to determine other modalities of treatment that may be needed in conjunction with medication. HRQoL is a holistic concept that views human health and well-being within the context of the WHO's definition of health (Guyatt, Feenz & Patrick, 1993). The HRQoL measures are often used to evaluate individual patients or groups of patients with chronic musculoskeletal disorders in many health-care settings.

Dispositional optimism, on the other hand, the generalized expectancy for good rather than bad to happen in the future, is associated with a broad range of positive outcomes, including better performance, higher likelihood of goal attainment, better mental health, and better physical health. Optimists' advantage in well-being seems to come in part from their characteristic approach orientation to managing both stressful problems and stress-induced emotions, that is, their coping style (Solberg Nes & Segerstrom, 2006).

While the existing findings on optimism and well-being or quality of life (QoL) seem to be fairly consistent, relatively few studies have explored the nature of optimism's influence on QoL in people with musculoskeletal problems. The purpose of this chapter is to find out the influence of dispositional optimism in health care professionals suffering from musculoskeletal problems.

## **CHRONIC MUSCULOSKELETAL PAIN AND QUALITY OF LIFE**

Musculoskeletal disorders (MSD) include a wide range of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels. These include clinical syndromes such as tendon inflammation and related conditions (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica), and osteoarthritis, as well as poorly standardized conditions such as myalgia, low back pain and other regional pain syndromes not attributable to known pathology. The body regions that are most commonly involved are the low back, neck, shoulder, forearm, and hand, although, recently, the lower extremity has received more attention (Punnett & Wegman, 2004).

Interestingly, individuals with the same level of disease severity may display different levels of disability. Furthermore, it is estimated that about half of self-reported disability is due to factors other than actual functional impairment or disease severity (Eaton et al., 1990; Spiegel et al., 1988). In fact, it has been estimated that only 30% of patients who display significant radiologic evidence of osteoarthritis will report physical symptoms (Cobb, Merchant, & Rubin, 1957). Factors such as pain, personality, and other psychological variables may play a significant role in disability (Daltroy & Liang, 1993). Of particular interest are an individual's dispositional and global

expectations of success or of failure, as described by the constructs of optimism and pessimism.

## **Impacts in Physical Health**

Chronic musculoskeletal pain impacts negatively on physical health in several ways. Firstly, there is enough evidence that individuals with CMP are more likely to have long-term activity limitation (Reginster & Khaltaev, 2002). Many previous studies revealed that there is a strong association between pain and decrease in physical activity (Hawley & Wolfe, 1991; Anderson & Chernoff, 1993; MacKinnon, Avison & McCain, 1994). Pain severity (Ang, Kroenke & McHorney, 2006), duration (Kovacs et al, 2005), or localization (Schasfoort, Bussmann & Stam, 2004) may play a critical role in an individual's physical functioning. The decrease in physical activity due to pain may contribute to a progressive decrease in muscle strength and flexibility and to overweight. The combination of these consequences may exacerbate the chronic pain associated with musculoskeletal disorders. In many epidemiologic studies, it has been shown that pain is one of the most important determinants of physical disability among patients with osteoarthritis, low back pain, and rheumatoid arthritis (Creamer, Lethbridge-Cejku & Hochberg, 2000; Kovacs, Muriel et al, 2005; Katz, Morris & Yelin, 2006).

## **Impacts in Mental Health**

As anyone would think, living with a chronic disease creates a significant psychological burden for those with it, no matter what the problem or the part of the body that pains. Over time, a high degree of chronic pain and impairment may progress into pain-related fear and anxiety, activity avoidance, and depression that further reduce daily function and quality of life.

Evidence shows that pain and negative affectivity intercorrelates (Andrasik, 2004; Fernandez, 2002). Living with chronic pain can cause or exacerbate symptoms of anxiety and depression, even in patients without a history of mental health problems. Depressive symptoms are quite common among patients with chronic musculoskeletal pain (Magni et al 1994). Compared with the general population, many fibromyalgia patients report

more depressive symptoms (Tuzun et al, 2004). Evidence is presented that depressive symptoms are also prevalent among patients with rheumatoid arthritis and low back pain. Research has shown that major depressive disorders occur in 13% and 23% of patients with rheumatoid arthritis (Frank et al, 1998; Murphy, Creed & Jayson, 1998; Creed, 1990; Abdel-Nasser et al, 1998). Patients with rheumatoid arthritis group have a significantly higher risk of developing depressive symptoms 2–4 years after diagnosis (Polsky et al, 2005). The prevalence of major depression in patients with chronic low back pain is 3–4 times greater than in the general population (Sullivan, Reesor, Mikail & Fisher, 1992).

Anxiety is another comorbid condition reported frequently among patients with chronic pain (Eisendrath, 1995). In a research conducted in four rehabilitation clinics in Germany, evidence has shown that 24% of the patients with musculoskeletal disorders has scores above the cut-off value of 11 on the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS) (Harter, Reuter, Weisser-Schretzmann, & Aschenbrenner, 2002). Anxiety-related symptoms are significantly more common in patients with fibromyalgia compared with the general population (Pagano et al 2004). Anxiety disorders are also commonly seen with other musculoskeletal conditions. In a research among patients with rheumatoid arthritis, it was found that the 17.8% of patients had evidence of moderate or severe anxiety (Zyrianova et al, 2006). Polatin and colleagues reported that prevalence of anxiety disorders was 17% in patients with low back pain (Polatin et al, 1993).

## **DISPOSITIONAL OPTIMISM**

Optimism, in recent years, has been both the subject of a great deal of attention as well as the part of an extensive body of research (for reviews, see Chang, 2001; Peterson, 2000; Peterson & Bossio, 1991; Scheier & Carver, 1992; Seligman, 1991; Snyder, 1994; Taylor, 1989). Measures of optimism have been shown to predict diverse and important benefits for individuals—positive mood (see Weisse, 1992), mastery-oriented achievement (Curry, Snyder, Cook, Ruby, & Rehm, 1997; Peterson & Park, 1998), physical health (Kamen-Siegel, Rodin, Seligman, & Dwyer, 1991; Peterson, 1988; Scheier & Carver, 1987; Segerstrom, Taylor, Kemeny, & Fahey, 1998), and greater recovery from illness or surgery (Scheier et al., 1989), to name but a few.

Optimism has been shown to be positively related to psychological characteristics associated with healthy behavior and good health, including internal locus of control, high self esteem and the use of problem-focused coping strategies (Lightsey, 1996). It is also associated with persistence with health related actions and with positive health outcomes, such as rapid recovery from surgery (Chamberlain, Petrie, & Azariah, 1992; Scheier & Carver, 1985, 1992). Pessimists experience more hopelessness, depression, stress, alienation, and social anxiety than optimists (Scheier & Carver, 1985, 1992) furthermore these characteristics are likely to be associated with negative behaviours and outcomes. Among caregivers of patients with rheumatoid arthritis, for example, the patient's physical health status was found to be strongly related to the caregiver's pessimism (Beckham, Burker, Rice, & Talton, 1995).

Optimists have more adaptive and stable coping tendencies (Carver, Weintraub, & Scheier, 1989), adjust better to the rigors of college life (Aspinwall & Taylor, 1992), adopt safer sexual behavior (Morrill, Ickovics, Golubchikov, Beren, & Rodin, 1996), and have greater success in alcohol treatment programs (Strack, Carver & Blaney, 1987). Finally, optimism has been shown to predict academic, athletic, military, occupational, and political success (Peterson, 2000). There are few constructs in psychology that have known the predictive utility and uniformity of results currently enjoyed by optimism.

Scheier and Carver's (1985) conceptualization of optimism derived from a model of self-regulation in which goal directed behavior is best predicted by outcome expectancies. Expectations that good things will happen are characteristic of optimists. Believing that different expectancies form the basis of a stable personality characteristic, Scheier and Carver developed the Life Orientation Test (LOT). LOT consists of eight items (plus four filler items), four of which are positively and four negatively worded. Respondents indicate their agreement with statements on a 5-point Likert type scale where 0 = *strongly disagree* and 4 = *strongly agree*. High scores indicate high levels of optimism.

LOT is the most commonly utilized measure of optimism. Few years ago, Scheier, Carver, and Bridges (1994) modified the LOT as they found that two of the original positively phrased items were measuring an individual's method of coping rather than generalized expectancies. For the LOT-Revised (LOT-R) the two coping items were removed, an additional positively phrased item was included, and one negatively worded item was not included in the scoring. To date, research investigating optimism has mainly utilized the

original LOT incorporating the two coping items. Over the past decade much confusion and controversy has arisen regarding the dimensionality of the LOT.

The correlation between the revised scale and the original scale is .95. Scheier et al. (1994) affirmed that the LOT-R has content validity. The original LOT was modified by Scheier et al. (1994), and test-retest reliabilities were reported for four groups of college students:  $r = .68$  at 4 months,  $r = .60$  at 12 months,  $r = .56$  at 24 months, and  $r = .79$  at 28 months. Relevant to construct validity for the LOT-R, a principal components factor analysis was completed on a sample of 2,055 college undergraduates and yielded one factor. Convergent validity for the LOT-R was evaluated with the Self-Mastery Scale, and the results were  $r = .51$  for men and  $r = .46$  for women. The LOT-R correlated positively with the Rosenberg's Self-Esteem Scale (RSES),  $r = .50$  for men and  $r = .54$  for women in a sample of 1,420 students. Discriminant validity was demonstrated when the LOT-R correlated negatively with the Anxiety Scale for men ( $r = -.52$ ) and for women ( $r = -.54$ ) in a sample of 2,033 students. Coefficient alpha reliability for the LOT-R was .78 in the sample of 2,055 college students (Scheier et al., 1994).

Scheier & Carver (1985) have preferred the unidimensional view, which means that optimism and pessimism form two polar opposites. This suggests that an individual can be either optimistic or pessimistic but cannot be both. It is their opinion that the two separate dimensions that do emerge in some studies probably reflect differences in item wording rather than content. Some research, however, (Vautier, Raufaste & Cariou, 2003) indicates that this view may be inaccurate and that optimism can be better conceptualized as two partially independent dimensions on which an individual can score positively or negatively.

## METHODOLOGY

### Participants

Participants consisted of 300 nurses recruited from three Hospitals of Greece, two in Athens and one in Ioannina. Only participants who were born and had lived continuously in Greece and who were fluent in Greek were invited to take part in the study. The final sample, therefore, consisted of 272 participants of Greek ethnicity. The sample consisted of 54 (19, 9%) men and 218 (80, 1%) women with a mean age of 37, 7 (SD 8, 3). The age range in the

sample was from 22 to 63 years. The majority of these participants (59.1%) had college degrees as their highest educational qualification, with smaller groups having attained secondary schooling (26.8%), elementary schooling (2.9%) or postgraduate (11.2%) degrees. In terms of marital status, 64.9% were married, 27.9% were single, 6.2 were divorced and the remainders were widows (1.1%). Also 69,5% had a medium income, 21,7% had a low income and the rest 8,8% a higher than 2000 euros income.

## **Procedures**

All participants were recruited voluntarily from the three hospitals that took part in the study. Scientific Committees of the three hospitals were informed for the purpose of the study and the confidentiality and anonymity of the process. After giving written consent, nurses who were randomly selected completed a questionnaire on demographic and clinical characteristics along with the scales for optimism (LOT-R) and quality of life (Euro5D and SF12).

After completing relevant informed consent forms, participants completed their surveys individually (taking between 10 and 15 minutes), before returning the two-page questionnaire to the experimenter. All participants took part on a voluntary basis, were not remunerated for their participation, were debriefed following the completion of the questionnaire and no personal information was required.

## **MEASURES**

### **Demographic Data**

Demographic information collected included age, gender (i.e., male or female), marital status educational level (i.e, Primary School, Secondary school, College or University and Master Degree). Clinical data were extracted from health care professionals' interviews using a standardized form by a medically qualified researcher.

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## Independent Measures

### *1. Pain*

Pain was assessed using a 'pain meter'. This comprised of a white plastic rule graduated in 11 points labeled 0–10, along which a red pointer slides revealing a red bar. Respondents were asked to move the slider to a point corresponding to 'Your pain at its worst in the last month'. Respondents were told that a rating of '0' denoted 'no pain at all' while a '10' was 'pain so severe as to prohibit all activity; the worst pain you can imagine'. Scores were then transferred by the interviewer to an 11-point (0–10), 10 cm visual analogue (VA) scale labeled '0' and '10' at opposite ends. This was later coded to an integer from 1 to 10.

### *2. Optimism*

Optimism is defined in this study as 'generalized (positive) expectations for important life outcomes', so all participants completed the Greek Version of the LOT-R (Lyrakos et al, 2010). The LOT-R (Scheier, Carver, & Bridges, 1994) is comprised of 10 items, 4 of which are fillers and are not scored, measuring expectations about positive outcome in general (Scheier, Carver, & Bridges, 1994). The 5-response format, with a scale of 0 (strongly disagree) to 4 (strongly agree), has a range of scores from 0 to 24. Responses are scored such that higher scores represent greater optimism, while lower scores represent lower optimism, henceforth referred to as pessimism. The LOT-R has been shown to be a reliable and valid measure of dispositional optimism–pessimism (Scheier et al., 1994).

The Greek version was found to have good reliability and validity (Lyrakos et al., 2010). The reliability coefficient in the present study was 0.71.

## Dependent Measures

### *1. Quality of life (QoL) with Euro-5D*

The EQ-5D (Rabin, & de Charro, 2001; Brooks, Rabin, & de Charro, 2003) is a brief, standardized, generic measure of HR-QOL that provides a profile of patient function and a global health state rating (Brooks, Rabin, & de Charro, 2003). EQ-5D includes single item measures of five health dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each item has three possible response options that allow

the patient to ordinally (no problems/some or moderate problems/extreme problems) rate their current state with respect to each of the 5 domains. In addition, EQ-5D includes a global rating of current health using a visual analog scale (VAS) ranging from 0 (worst imaginable) to 100 (best imaginable).

The descriptive system of the EQ-5D allows for 243 unique health states. A preference-based scoring function is used to convert the descriptive information to a summary index score. More than 15 value sets are available for scoring the EQ-5D, based on rating scale and time trade-off (TTO) valuation but no one is for Greece, so the summary of the five dimensions scores were used to create a total score from 0 to 15, with 0 representing perfect health and 15 indicating health conditions worse than death. Each dimension were also used independently in the analysis to check its contribution in the composite scores of SF12 (MCS12 and PCS12 respectively).

## ***2. 12-item health survey (SF-12)***

The SF-12 has been validated for use among Greek people (Kontodimopoulos et al, 2007) and consists the short form of SF-36 which is a self-administered, generic health related quality of life (HRQL) instrument that assesses function and wellbeing via multi-item scales measuring the following eight domains (Ware, Kosinski, Bayliss, McHorney, Rogers, & Raczek, 1995; Ware & Sherbourne, 1992; Ware, Snow, Kosinkio & Crandek, 1993): physical functioning (PF), role physical (RP), role emotional (RE), vitality (VT), mental health (MH), social functioning (SF), general health (GH), and bodily pain (BP).

The 12-item Health Survey (SF-12) was developed as a shorter alternative to the SF-36 for use in large-scale studies, and its reliability and validity have been documented (Ware, Kosinski and Keller, 1996). Scale scores are estimated for four of the health concepts (PF, RP, RE and MH) using two items each, whereas the remaining four (BP, GH, VT and SF) are represented by a single item. All 12 items are used to calculate the physical and mental component summary scores (PCS12 and MCS12) by applying a scoring algorithm empirically derived from the data of a US general population survey (Ware, Kosinski & Keller, 1995). Performance of the component summary scores was initially studied in nine languages and it has been recommended that the US-derived summary scores, which yield a mean of 50 and a SD of 10, be used in order to facilitate cross-cultural comparison of results (Gandek et al, 1998). It appears to satisfactorily replicate SF-36 summary scores

constituting it an attractive generic instrument to use in clinical practice or research when studying HRQL (Kontodimopoulos et al, 2007; Ware et al., 1993, 1995; Ware & Sherbourne, 1992). The SF-12 has been extensively used in health status studies involving the general population (Johnson and Coons, 1998; Johnson and Pickard, 2000; Hanmer et al, 2006), as well as in studies with disease groups (Gandhi et al, 2001; Globe et al, 2002; Haywood et al, 2002; Cote et al, 2004).

## STATISTICAL ANALYSES

The normality of the items of all measures was investigated and found to be within the level recommended for confirmatory factor analysis CFA with maximum-likelihood (ML) estimation (skewness <2, kurtosis <7; West, Finch, & Curran, 1995) and still within acceptable values for normality (Curran et al. 1996).

Standard descriptive analyses (mean and standard deviation [SD]) assessed sample characteristics. Linear associations between study variables were examined using the Pearson product-moment correlation coefficient ( $r$ ).

Statistical analysis was performed using SPSS for Windows 16. Analyses of the relationship between independent variables and HRQL were performed to establish those variables associated with HRQL.

Due to past decade's confusion and controversy that has arisen regarding the dimensionality of the LOT in order to estimate the factor structure of the LOT-R for the present study, an exploratory factor analysis using principal axis factoring with an orthogonal (Varimax) rotation was conducted to the sample. Following the two factor solution that revealed from the factor analysis both the overall score of GrLOT-R as it is proposed by Shier and Carver as well as the two subscales of optimism and pessimism were used to access the influence of optimism in HRQL.

Bivariate analyses (t-tests, ANOVA and Pearson's and Spearman's correlation coefficients as appropriate) were then performed to evaluate the relationships between independent variables and health related quality of life as it was measured with the two main domains of the SF12, the PCS12 and MCS12 and Euro5D Visual analogue scale. Those independent variables that were associated with a dependent variable in bivariate analyses with a  $p$  value <0.05 were subsequently included in linear multiple regression analyses to determine independent predictors.

Fourteen separate linear regression analyses models were conducted to individually test the effects of optimism on each of the two main domains of SF12, the Euro5D Visual analogue scale and the summary index score of Euro5D with GrLOT-r (optimism) entered in the last step of each of the seven models and the two subscales of GrLOT-R (optimism and pessimism) entered in the last step of the other seven models.

## RESULTS

The final results were based on 257 participants, as the remaining – participants had missing data, which meant it was impossible to compute total scores for a given assessment instrument. Component scores for each inventory or subscale was computed for each participant and then group means and standard deviations were computed and they are shown in Table 1 below.

**Table 1. Characteristics of the sample and group means, standard deviations and Cronbach's  $\alpha$**

Characteristic	Mean	SD	Min	Max	$\alpha$
Age	37,7	8,3	22	63	
Number of children	1,1	1,1	0	4	
Absence days from work	3,4	10,4	0	120	
Pain intensity	1,87	2,2	0	8	
Years of working	12,7	8,3	0,6	32	
Euro5D VAS	78,9	16,7	10	100	
Euro5D summary	7,01	1,5	5	12	.66
PCS12	45,6	10,7	13,2	64,4	.79
MCS12	45,1	9,8	17,2	63,8	.65
GrLOT-R	14,4	4,2	,00	24,0	.71
GrLOT-R optimism	7,8	2,4	,00	17,0	.66
GrLOT-R pessimism	6,7	2,6	,00	12,0	.72

N=257. GrLOT-R optimism= optimistic scale (3 items factor), GrLOT-R pessimism= pessimistic scale (3 items factor), Min= minimum, Max= maximum,  $\alpha$ = Cronbach's alpha.

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## Internal Consistency of GrLOT-R

Internal reliability coefficients for GrLOT-R optimism (the three positively worded items) and GrLOT-R pessimism (the three negatively worded items) were .72 and .66 respectively. These findings are consistent with Cronbach's  $\alpha$  found with the German version of the scale (.71 for optimism and .68 for pessimism; Herzberg et al, 2005). The internal consistency coefficient (Cronbach's  $\alpha$ ) for the one factor (total scale) Greek version of the LOT-R was .71 for the total sample (n=276). This is consistent with Cronbach's  $\alpha$  found with the French version of the scale (.71 too; Allison et al, 2003), and lower than the Finland Version (.78; Ylöstalo et al, 2003). Cronbach's alpha was .71 for Optimism and .66 for Pessimism subscales independently in the Finland Version.

The internal consistency for the GrLOT-R total and subscale scores is presented in Table 2. Item-remainder correlations ranged between .27 (item 3) and .57 (item 7). Cronbach's  $\alpha$  coefficients indicated moderate ( $\geq .64$ ) internal consistency for all summary scores, ranged between .64 and .73 as seen in table 3.

## Internal Structure: Factor Analysis

Factor loadings after rotation are reported in Table 2. The analysis identified two factors accounting for 62.52% of the variance. This solution was factorially simple and interpretable, with three items loading on Factor 1 (eigenvalues and percentage variance, derived from initial principal axis factoring, 2.51 and 41.850% respectively) and three items loading on Factor 2 (eigenvalue = 1.24, variance explained 20.67%). The items loading on Factor 1 were the three items considered to represent pessimism; the three items loading on Factor 2 were the three items considered to represent optimism. These results support categorization of the LOT-R into two separate factors tapping Pessimism and Optimism.

**Table 2. Item- Total statistics for the GrLOT-R and Factor loadings for PCA**

GrLOT-R Items	Mean	SD	Scale mean if item deleted	Scale variance if item deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Rotated Component Matrix <sup>b</sup>	
							Factor 1	Factor 2
Item 1	2.3	1.1	12.1	12.6	.425	.680	<b>.817</b>	.253
Item 3*	1.8	1.1	12.6	13.5	.279	.724	-.094	<b>.736</b>
Item 4	2.6	1.0	11.8	12.9	.412	.684	<b>.793</b>	.060
Item 7*	2.3	1.1	12.2	11.5	.570	.634	.281	<b>.798</b>
Item 9*	2.6	1.1	11.9	11.6	.565	.636	.280	<b>.794</b>
Item 10	2.6	1.1	11.6	12.2	.434	.678	<b>.640</b>	.253

*N*= 272. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 3 iterations.

\*= reversed items composing pessimism factor. In bold all significant factor loadings.

## Descriptive Analysis and Correlations

To test how the LOT-R measures of Optimism and Pessimism related to external variables, bivariate correlations were calculated between the GrLOT-R Optimism, GrLOT-R Pessimism, GrLOT-R Total, and the quality of life and demographic variables. Despite the LOT-R loading on the two factors of Optimism and Pessimism in this study, the LOT-R has been examined in other studies as a unidimensional construct. To allow for a contrast between the use of the factor scores (of Optimism and Pessimism) and the total score of the LOT-R, the LOT-R Total was also included in this correlational analysis (see Table 3).

Table 3 presents correlations for age, kids in the family of the health care workers, days of absence from work due to musculoskeletal problem, the amount of years in the same job, self-reported quality of life as it was measured with the global rating of current health (VAS scale of Euro5D measurement) and the five dimensions of Euro5D, optimism (GrLOT-R), physical (PCS12) and mental (MCS12) composite scores of SF12 and pain intensity summary scores. PCS12 and MCS12 as well as the global rating of current health were significantly ( $p < 0.001$ ) correlated with optimism. The GrLOT-R optimism and pessimism subscale scores correlated significantly, and moderately with each other ( $r = -.35$ ), although both were strongly related to the LOT-R total score ( $r = .81$  and  $-.83$ , respectively).

**Table 3. Correlations of research variables †**

	Age	Kids	Ab/ce days	Pain intensity	Wor/g Years	Total health VAS	Eyro5D total	PCS12	MCS12	GrLOT-R	Optimism	Pessimism
Age	1											
Kids	<b>,441**</b>	1										
Absence days	<b>,284**</b>	<b>,085</b>	1									
Pain intensity	<b>,215**</b>	<b>,127*</b>	<b>,301**</b>	1								
Working Years	<b>,888**</b>	<b>,434**</b>	<b>,272**</b>	<b>,215**</b>	1							
Total health VAS	<b>-,260**</b>	<b>-,176**</b>	<b>-,215**</b>	<b>-,451**</b>	<b>-,232**</b>	1						
eyro5total	<b>-,259**</b>	<b>,106</b>	<b>,392**</b>	<b>,570**</b>	<b>,255**</b>	<b>-,629**</b>	1					
PCS12	<b>-,302**</b>	<b>-,160*</b>	<b>-,344**</b>	<b>-,564**</b>	<b>-,281**</b>	<b>,547**</b>	<b>-,660**</b>	1				
MCS12	<b>-,094</b>	<b>-,061</b>	<b>-,101</b>	<b>-,166**</b>	<b>-,130*</b>	<b>,412**</b>	<b>-,403**</b>	<b>,124*</b>	1			
GrLOT-R	<b>-,091</b>	<b>-,060</b>	<b>-,121*</b>	<b>-,240**</b>	<b>-,064</b>	<b>,360**</b>	<b>-,392**</b>	<b>,299**</b>	<b>,375**</b>	1		
Optimism	<b>,014</b>	<b>,011</b>	<b>-,037</b>	<b>-,166**</b>	<b>,045</b>	<b>,290**</b>	<b>-,337*</b>	<b>,243**</b>	<b>,276**</b>	<b>,808**</b>	1	
Pessimism	<b>-,161**</b>	<b>-,114</b>	<b>-,164**</b>	<b>-,236**</b>	<b>-,147*</b>	<b>,300**</b>	<b>-,306**</b>	<b>,250**</b>	<b>,342**</b>	<b>,829**</b>	<b>,345**</b>	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

† Pearson's r (p-value). In bold the significant

**Table 4. T test and Anova for QOL and optimism**

Variables		PCS12	MCS12	VAS	Euro5D summary	GrLOT-R	Optimism	Pessimism
	Categories	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Mobility †	<i>No problems</i>	49,3(8,7)	45,9(10,1)	82,8(15,3)	6,4(1,1)	15(3,9)	8,2(2,4)	6,8(2,4)
	<i>Moderate problems</i>	35,6(9,4)	42,9(8,5)	68,2(15,9)	8,7(1,1)	12,6(4,2)	6,7(2,5)	5,9(2,7)
Self care †	<i>No problems</i>	46,2(10,4)	45,3(9,8)	80(15,6)	6,8(1,4)	14,4(4,1)	7,8(2,4)	6,6(2,5)
	<i>Moderate problems</i>	32,7(10,2)	41,5(8,9)	59,2(23,7)	10,2(1,1)	12,9(4,3)	7,2(3,2)	5,7(3,1)
Usual activities †	<i>No problems</i>	49,4(8,3)	46,3(9,6)	83,4(13,9)	6,3(1)	14,9(4)	8,1(2,4)	6,8(2,5)
	<i>Moderate problems</i>	35,3(9,6)	41,9(9,6)	67,2(17,6)	8,8(1,2)	15,9(3,9)	7(2,6)	5,9(2,4)
Pain discomfort‡	<i>No problems</i>	52,1(7)	48,5(9,6)	97,9(11,5)	5,7(0,7)	15,8(3,4)	8,6(2,2)	7,2(2,3)
	<i>Moderate problems</i>	41(10,2)	42,4(9,1)	73(15,7)	7,8(1,1)	13,3(4,1)	7,1(2,5)	6,2(2,5)
	<i>Severe problems</i>	31,4(11)	41,7(9,8)	56,6(24)	10,7(1,1)	12,3(5,1)	7,6(3,6)	4,8(3)
Anxiety depression‡	<i>No problems</i>	49,1(9,6)	50,8(7,8)	88,1(11,4)	5,7(1)	16,3(3,8)	8,6(2,2)	7,7(2,5)
	<i>Moderate problems</i>	44,6(10,3)	44,2(8,8)	77,8(15,4)	7,3(1,3)	14(3,7)	7,7(2,3)	6,3(2,4)
	<i>Severe problems</i>	41,4(13,8)	33,4(9,1)	60,5(19,8)	7,8(1,4)	11,2(4,9)	6,1(3)	5,1(2,5)
Income †	<i>Low</i>	45,2(10,6)	44,3(9,8)	78,9(18,1)	7,1(1,6)	14,6(4,1)	7,9(2,6)	6,6(2,3)
	<i>Medium</i>	45,3(10,8)	45,2(9,8)	78,4(16,5)	7(1,5)	14,4(4,2)	7,7(2,4)	6,7(2,5)
	<i>High</i>	49,1(10,1)	45,9(10,2)	84,3(14,2)	6,5(1,5)	14,3(4,2)	7,8(2,4)	6,5(1,5)

**Table 4. (Continued)**

Variables		PCS12	MCS12	VAS	Euro5D summary	GrLOT-R	Optimism	Pessimism
	Categories	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Education †	<i>Primary</i>	36,2(9,6)	44,9(4,4)	78,9(14,9)	7,7(1,1)*	13,3(2,6)	8(2,7)	5,3(1,3)*
	<i>Secondary</i>	42,3(11)	43(9,6)	73,2(18,2)	7,3(1,6)*	13,6(4,1)	7,6(2,8)	6(2,4)*
	<i>College-University</i>	46,3(10,4)	46,1(9,6)	80,4(15,9)	6,9(1,6)*	14,6(4,2)	7,8(2,3)	6,9(2,6)*
	<i>Master- PhD</i>	52,7(7,4)	44,9(11,8)	86,4(12,4)	6,4(1,2)*	15,4(3,9)	8(2,2)	7,4(2,3)*
Musculoskeletal problem †	<i>Yes</i>	40,7(10,1)	44,1(9,5)	72,7(16,8)	7,6(1,5)	13,6(4,0)	7,5(2,6)*	6,5(2,5)
	<i>No</i>	52,3(7,6)	46,4(9,9)	87,8(11,7)	6,1(1,1)	15,4(4,1)	8,2(2,2)*	7,3(2,5)
Specialty †	<i>Nurses</i>	46,2(10,6)*	44,6(10,3)*	79,9(16,2)*	7,1(1,6)*	14,5(4,2)	7,8(2,3)	7,8(2,6)
	<i>Nursing aid</i>	42,5(11,2)*	43,5(9,6)*	74,4(18,1)*	7,2(1,6)*	13,6(3,7)	7,8(2,6)	5,8(2,3)
	<i>MD, Mpsy, &amp; other</i>	49,5(8,7)*	49,4(6,9)*	84,4(13,2)*	6,3(1,3)*	15,3(4,6)	7,7(2,6)	7,5(2,5)
Marital status	<i>Single</i>	48,6(8,7)*	45,3(9,3)	83,9(13,8)*	6,6(1,4)	14,9(4,2)	7,8(2,1)	7,2(2,6)
	<i>Married</i>	44,3(11,3)*	45,4(9,9)	77,9(16,9)*	7,1(1,6)	14,2(4,1)	7,7(2,6)	6,4(2,6)
	<i>Divorced/widow wed</i>	47,1(9,2)*	42,3(10,5)	71(21,2)*	7,4(1,5)	14,4(4,6)	8(2,6)	6,4(2,4)

† when the test is t independent samples test and † when the test is One-way Anova with post hoc Bonferroni alpha (0, 05). Bold for p=, 000, Bold\* for p<,05.

Specifically the total score of GrLOT-R was moderately positive correlated with the three of the quality of life variables (physical composite score (PCS12), mental composite score (MCS12), VAS scale of Euro5D measurement).

The summary score of the five dimensions of Euro5D measurement was moderately negative correlated with the total score of GrLOT-R indicating that more optimistic people have fewer problems in the Euro5D dimensions. Pain intensity and total score of GrLOT-R were negatively and significantly correlated such as higher levels of optimism were associated with less pain.

GrLOT-R and the absence days from work due to musculoskeletal problem were also negatively and significantly correlated indicating that those with higher levels of optimism (GrLOT-R) work more days, while age and the working years were generally uncorrelated. Significant but moderate correlations exists between pain intensity and age, the number of kids in the family of the health care workers, days of absence from work due to musculoskeletal problem, the amount of years in the same job and all the quality of life variables.

## Testing for Control Variables

The extent to which demographic variables (age, education, marital status, employment status), and medical variables (such as pain intensity and musculoskeletal difficulties) were related to outcome variables was assessed, thus determining the need control for these variables in the main analyses. T test were also contacted for three (mobility, usual activities and self care) of the five domains of Euro5D since the sample used only the two out of three possible answers (no problems and moderate problems) and the Anova test was not possible to be done. The significant associations with the study outcome variables that emerged from the t-test and ANOVA analyses are shown in Table 4 respectively.

Using T independent test, problems in mobility were positively associated with PCS 12 ( $t = 10.793$ ,  $p = .0001$ ), MCS12 ( $t = 2.194$ ,  $p = .029$ ), global rating of current health ( $t = 6.634$ ,  $p = .0001$ ), GrLOT-R ( $t = 4.226$ ,  $p = .0001$ ), optimism (3 positive items of GrLOT-R) ( $t = 4.129$ ,  $p = .0001$ ) and pessimism (3 negative items of GrLOT-R) ( $t = 2.745$ ,  $p < 0.05$ ) but negatively associated with the Euro5D summary index ( $t = -14.103$ ,  $p = .001$ ).

In the same way, problems in self care were positively associated with PCS 12 ( $t = 4.393$ ,  $p = .0001$ ) and global rating of current health ( $t = 4.570$ ,

$p=.0001$ ) but negatively with the Euro5D summary index ( $t = -8.612$ ,  $p = .0001$ ) but there were no other significant association with MCS12 and the subscales or total score of GrLOT-R.

Problems in usual activities were also positively associated with PCS 12 ( $t = 11.425$ ,  $p = .0001$ ), MCS12 ( $t = 3.206$ ,  $p <.05$ ), global rating of current health ( $t = 6.634$ ,  $p = .0001$ ), GrLOT-R ( $t = 4.226$ ,  $p <.05$ ), optimism (3 positive items of GrLOT-R) ( $t = 4.129$ ,  $p = .0001$ ) and pessimism (3 negative items of GrLOT-R) ( $t = 2.745$ ,  $p < 0.05$ ) but negatively associated with the Euro5D summary index ( $t = -14.103$ ,  $p = .001$ ).

The existence of a musculoskeletal problems in the sample was negatively associated with PCS 12 ( $t = - 10.557$ ,  $p = .0001$ ), MCS12 ( $t = - 1.918$ ,  $p <.05$ ), global rating of current health ( $t = - 8.480$ ,  $p = .0001$ ), GrLOT-R ( $t = - 3.689$ ,  $p = .0001$ ), optimism (3 positive items of GrLOT-R) ( $t = - 2.457$ ,  $p <.05$ ) and pessimism (3 negative items of GrLOT-R) ( $t = - 3.752$ ,  $p = .0001$ ) and positively associated with the Euro5D summary index ( $t = 9.240$ ,  $p = .0001$ ).

A one-way between groups analysis of variance (table 4) was conducted to explore the impact of the remaining two domains of Euro5D (pain/discomfort, and anxiety/depression) questionnaire, education, income and the profession of the sample in HRQOL as measured by the PCS12, MCS12 and the visual analog scale that was measuring global rating of current health.

Results saws that there were no significant differences between composite scores of SF12, the visual analog scale that was measuring global rating of current health, Euro5D summary index or GrLOT-R and income but there was statistically significant difference at the  $p<0,05$  level in all quality of life scales and pessimism subscale with the occupation of the health care professionals.

In particular there was statistically significant difference at the  $p<0.05$  level in PCS12 scores for the three categories of health care professionals [ $F_{2, 252} = 6.282$ ,  $p = .002$ ]. Post-hoc comparisons using the Group comparison with Bonferroni correction ( $p<0.05$ ) indicated that the mean score of PCS12 for nursing aid workers (mean = 42.5, SD = 11.2) was significantly different from the mean score of PCS12 for other health care professionals (mean = 49.5, SD = 8.7) (mean difference = -6.282,  $p <0.05$ ). MCS12 scores [ $F_{2, 252} = 5.478$ ,  $p = .005$ ] differed between nurses (mean = 44.6, SD= 10.3), nursing aid (mean =43.5, SD = 9.6) and other health care professionals (mean = 49.6, SD = 6.9) (mean difference = -4.858 & -5.893  $p <0.05$ ). In the same way in global rating of current health [ $F_{2, 252} = 5.567$   $p = .004$ ] nursing aid scores (mean = 74.4, SD = 18.1) differed significantly from other healthcares professionals scores (mean = 84.4, SD = 13.2) (mean difference = 10.028,  $p <0.05$ ) and on Euro5D summary index [ $F_{2, 252} = 5.058$ ,  $p = .007$ ] nurses (mean = 7.1, SD = 1.5) and

nursing aid staff (mean = 7.2, SD = 1.6) differed significantly from the other healthcare professionals (mean = 6.3, SD = 1.3) (mean difference = -0.761 & -0.874,  $p < 0.05$ ).

It is interesting that although there were no significant differences between health care professionals and GrLOT-R or optimism, pessimistic scores differed significantly between the three different professions [ $F_{2, 252} = 7.929$ ,  $p = .0001$ ] with nursing aid (mean = 5.8, SD = 2.3) being the more pessimists of the three categories (mean difference = -0.965 {nurses – nursing aid} & -1.716 {nursing aid – other professionals},  $p < 0.001$ ).

According to the demographic variables there was statistically significant difference at the  $p < 0.001$  level in PCS12 scores for the four levels of education [ $F_{3, 251} = 8.937$ ,  $p = .0001$ ]. Post-hoc comparisons using the Group comparison with Bonferroni correction ( $p < 0.05$ ) indicated that the mean score of PCS12 for people having attended primary school (mean = 36.2, SD = 9.6) was significantly different from the mean score of PCS12 for people with a Master or Doctoral (mean = 52.7, SD = 7.4) (mean difference = -16.589,  $p = .0001$ ). Also the mean score of PCS12 for people having attended secondary school (mean = 42.3, SD = 11) was significantly different from the mean score of PCS12 for people with a college or University education (mean = 46.3, SD = 10.4) (mean difference = -3.974,  $p < .05$ ) and for people with a Master or Doctoral (mean = 52.7, SD = 7.4) (mean difference = -10.384,  $p = .0001$ ).

There was also statistically significant difference at the  $p < 0.001$  level in global rating of current health scores for the four levels of education [ $F_{3, 253} = 5.298$ ,  $p = .0001$ ]. Post-hoc comparisons using the Group comparison with Bonferroni correction ( $p < 0.05$ ) indicated that the mean score of global rating of current health for people having attended secondary school (mean = 73.2, SD = 18.2) was significantly different from the mean score of global rating of current health for people with a college or University education (mean = 80.4, SD = 15.9) (mean difference = -7.242,  $p < .05$ ) and for people with a Master or Doctoral (mean = 86.4, SD = 12.4) (mean difference = -13.175,  $p < .05$ ).

Anova found a statistically significant difference at the  $p < 0.05$  level in Euro5D summary index for the four levels of education [ $F_{3, 253} = 5.652$ ,  $p = .0001$ ] but Post-hoc comparisons using the Group comparison with Bonferroni correction ( $p < 0.05$ ) indicated that the mean differences between the groups were not significant.

When controlling for the effect of marital status, Anova revealed a statistically significant difference at the  $p < .05$  level in PCS12 for the four groups of marital status (single, married, divorced, widowed) [ $F_{3, 251} = 2.903$ ,  $p = .035$ ] and in global rating of current health [ $F_{3, 253} = 3.715$ ,  $p = .012$ ]. Post-hoc

comparisons using the Group comparison with Bonferroni correction ( $p < 0.05$ ) indicated that the mean score of PCS12 for single people (mean = 48.6, SD = 8.7) was significantly different from the mean score of PCS12 of married people (mean = 44.3, SD = 11.3) (mean difference = 4.311,  $p < 0.05$ ). In the same way the mean score global rating of current health for single people (mean = 83.9, SD = 13.8) was significantly different from the mean score of global rating of current health of divorced people (mean = 77.9, SD = 16.9) (mean difference = -12.941,  $p < 0.05$ ).

Pain or discomfort problems had a very strong effect in all quality of life variables as well as in the total and sub scores of GrLOT-r. In specific, PCS12 [ $F_{2, 251} = 56.638$ ,  $p = .0001$ ], global rating of current health [ $F_{2, 254} = 44.313$ ,  $p = .0001$ ] and Euro5D summary index scores [ $F_{2, 254} = 245.51$ ,  $p = .0001$ ] differed for all categories of pain or discomfort, while MCS12 scores [ $F_{2, 251} = 13.481$ ,  $p = .0001$ ] differed only between people with no problems and moderate problems (mean difference = 6.080,  $p < .0001$ ).

The same happened in GrLOT-r scores [ $F_{2, 254} = 13.178$ ,  $p = .0001$ ] where people with no pain problems were as expected more optimistic than people with moderate (mean difference = 2.436,  $p < .001$ ) or severe problems (mean difference = 3.436,  $p < 0.05$ ). Post-hoc comparisons using the Group comparison with Bonferroni correction ( $p < 0.05$ ) indicated that the mean scores of pessimism had the same attitude as the total and optimistic sub scores but also differed between people with no problems and moderate problems of pain (mean difference = 0.985,  $p < 0.05$ ).

Finally anxiety or depression problems had a total effect on all variables as well as pain problems, with Post-hoc comparisons using the Group comparison with Bonferroni correction ( $p < 0.05$ ) indicating that the mean scores of all variables differs significantly between people with no problems, moderate and severe problems of anxiety or depression. F was 6.712 for PCS12 ( $p < .001$ ), 39.001 for MCS12 ( $p < .001$ ), 33.236 for global rating of current health ( $p < .001$ ), 71.097 for Euro5D summary index ( $p < .001$ ), 18.089 for GrLOT-R ( $p < .001$ ), 10.852 for optimistic sub scale ( $p < .001$ ) and 12.691 for pessimistic sub scale respectively.

## Multiple Regression Analysis for HRQOL

The analysis involved fourteen sets of multiple regression analysis, four for each outcome variable (PCS12, MCS12, and Euro5D VAS) and two for Euro5D summary index. Results are presented in detail for the four outcome

variables in Table 5 and 6. Table 5 summarizes the proportion of variance explained by control and explanatory variables using total score of GrLOT-R as an explanatory variable while table 6 summarizes the proportion of variance explained by control and explanatory variables using the two sub scales of GrLOT-R optimism and pessimism as the explanatory variables. Model 1 uses all significant control variables for each outcome variable that emerged from t test, Anova and Pearson correlation statistics, while model 2 is entering into the model the 5 dimensions of Euro5D as explanatory variables when Anova has pointed a significant effect.

As it was expected pain intensity was consistently related to poorer physical functioning and health while optimism was related to better mental and physical health.

Total score of GrLOT-R was the more significant predictor for mental composite score (MCS12) explaining the 35% of the MCS12 variance with occupation explaining the other 15% of the variance. In the second model for MCS12, anxiety or depression problems explained the 25%, problems with pain or discomfort the 16% while total score of GrLOT-R still remained a significant predictor explaining the 25% of the variance. Higher optimism scores were associated with significantly better MCS12.

Total score of GrLOT-R was also a significant predictor in the two models of global rating of current health (VAS of Euro5D) with the three dimensions of Euro5D gaining an important amount of the variance and pain intensity remaining a significant predictor in both models as expected.

In the first regression model for PCS12 total score of GrLOT-r manages to remain a significant predictor in the model ( $\beta = .147$ ,  $p < .05$ ) with pain intensity explaining the 44% of the variance but in the second model the entry of the 5 dimensions of the Euro5D seems to absorb all of the effect that GrLOT-R contributed at the first model and the new explanatory variables added between 14 per cent and 28.5 per cent to the variance accounted for.

In the first model for the Euro5D summary index, the total score of GrLOT-R was a negative significant predictor explaining the 24% of the variance, due to the fact that higher levels of the summary score declines poorer health since it counts for more problems in the five dimensions of the measurement.

**Table 5. Multivariate regression analysis of PCS12, MCS12, EQ-5D index, and EQ VAS; standardized beta coefficients (n = 272 to 256) for quality of life measures with GrLOT-R as explanatory variable**

Variables in model		Euro5D VAS		PCS12		MCS12		Eyro5D Summary
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1
Explanatory variables								
Age		-,091	-,069	<b>-,140*</b>	-,058	-	-	,144
N of kids		-,072	-,077	-,035	-,031	-	-	-
Absence days		-,006	,072	<b>-,129*</b>	-,077	-	-	<b>,216</b>
Years of working		,017	,070	-,031	-,034	-,076	-,062	,084
Musculoskeletal problem		<b>-,170*</b>	-,101	<b>-,214</b>	<b>-,179*</b>	-	-	<b>,144*</b>
Marital status	Single	-,048	-,034	,010	,014	-	-	-
	Married	-,015	-,036	-,021	-,043	-	-	-
	Divorced/widowed	<b>-,128*</b>	,094	,020	,051	-	-	-
Education:	Primary	,026	,033	-,095	-,051	-	-	-
	Secondary	<b>-,231</b>	-,120*	-,066	-,011	-	-	-
	College-University	-,082	-,079	,072	,073	-	-	-
	Master- PhD	,048	,042	<b>,136*</b>	<b>,095*</b>	-	-	-
Problems with:	mobility	-	-,052		<b>-,196</b>	-	,050	-
	Self care	-	-		-,012	-	-	-
	Usual activities	-	<b>-,177*</b>		<b>-,285</b>	-	-,049	-
	Pain/discomfort	-	<b>-,133*</b>		<b>-,149*</b>	-	<b>-,168*</b>	-

**Table 5. (Continued)**

Variables in model		Euro5D VAS		PCS12		MCS12		Eyro5D Summary
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1
	Anxiety/ depression	-	-,175		-,045	-	-,250	-
Specialty	Nurses	-,033	,016	,025	,037	,015	-,023	<b>,079</b>
	Nursing aid	,013	-,001	-,059	<b>-,117*</b>	,014	,021	<b>-,020</b>
	Other	,021	-,013	,038	-,026	<b>,154*</b>	<b>,123*</b>	<b>-,086</b>
Optimism		<b>,231</b>	<b>,144*</b>	<b>,147*</b>	,059	<b>,353</b>	<b>,254</b>	<b>-,245</b>
Pain intensity		<b>-,284</b>	<b>-,147*</b>	<b>-,447</b>	<b>-,226</b>	<b>,038</b>	<b>-,029</b>	<b>,357</b>
Model R <sup>2</sup>		<b>,355</b>	<b>,456</b>	<b>,429</b>	<b>,566</b>	<b>,170</b>	<b>,256</b>	<b>,454</b>

Note: coefficients with  $p < 0.001$  are in bold type and coefficients with  $p < 0.05$  are in bold type with \*

Model 2: when entering into the regression model the 5 dimensions of Euro5D as controlling variables.

Items 1–5 (Mobility, Self Care, Usual Activities, Pain/Discomfort, Anxiety/Depression) are EQ-5D health states

EQ-5D Visual Analog Scale (VAS) rating of global health status (0–100)

Of the control variables, the existence of a musculoskeletal problem was significantly associated with better scores on the Euro5D summary index scale and poorer scores in the other two physical scales (PCS12 and VAS) showing that musculoskeletal problems are synonymous for worst physical and global health. Age is a significant predictor only for PCS12 and Absence days from work for Both PCS12 and Euro5D summary index models. Secondary education graduates and divorced or widowed were associated with worse global rating of current health, while master or PhD graduates with better physical health (PCS12). Nursing aid staff was associated with poorer physical health but fewer problems in the summary index of Euro5D. The other health care professionals were associated with better mental health and fewer problems in the summary index of Euro5D while nurses had the more problems in the five dimensions of the Euro5D summary index score.

When the two subscales of GrLOT-R, optimism and pessimism were entered into the regression models both variables managed to stay into the third model as significant predictors of mental health but when the dimensions of Euro5D were added into the model only pessimism managed to explain a 23 % of the variance.

In the third model for global rating of current health, optimism explained the 15.8% and pessimism the 12.1% of the variance in the outcome variable while in the fourth model only pessimism was able to explain a 11.1% of the variance with the five dimensions of Euro5D explaining between 10.4 per cent and 17.7 per cent of the variance in the outcome variable.

Optimism was also able to explain the 24% of the variance in the Euro5D summary index score but both optimism and pessimism failed to be significant predictors in the variance for the third and fourth model in physical health (PCS12) with pain intensity being the stronger predictor variable explaining the 30.8 and 12.3 per cent respectively.

## CONCLUSION

The purpose of this study was to examine on the one hand the relationship between health-related quality of life, as it can be accessed through a generic measurement (SF12 and Euro5D), and on the other hand optimism, as it can be measured with life orientation test revised (LOT-R) in patients with musculoskeletal disorders, and we found that generalised optimism is a strong predictor for mental health in patients with musculoskeletal problems.

Factor analysis supported the potential validity of the subscales. Confirmatory factor analysis provided strong evidence for the existence of two factors within the LOT-R with items mirroring the optimism and pessimism subscales that have been identified consistently in previous literature. Over the past decade much confusion and controversy have arisen regarding the dimensionality of the LOT. Scheier and Carver (1985) have preferred the unidimensional view, that is, optimism and pessimism form polar opposites. This suggests that an individual can be either optimistic or pessimistic but cannot be both (Scheier et al. 1994). It is their opinion that the two separate dimensions that do emerge in some studies probably reflect differences in item wording rather than content. Some studies (Vautier and Raufaste 2006; Vautier et al. 2003), however, indicate that this view may be inaccurate and that optimism can be better conceptualized as two partially independent dimensions on which an individual can score positively or negatively.

Although the bidimensionality of LOT-R is proposed by the previous researchers that examined this affair on other adult samples (Chang et al. 1997; Marshall et al. 1992; Robinson-Whelan et al. 1997), in our opinion further research is needed to clarify the unidimensionality or bidimensionality of GrLOT-R, this is why both total score of GrLOT-R and the two subscales were used in statistical analysis for this chapter.

Further support for the bidimensionality of the LOT is associated with the low degree of relationship found between the two dimensions. Other studies considered these correlations insufficient to warrant viewing optimism and pessimism as a single construct. Myers and Steed (1999) found optimism and pessimism to be moderately correlated (.50) in a sample of university students, and drew a similar conclusion. These low to moderate relationships argue that the constructs are relatively independent, and important information could be lost if not measured separately. In relation to the dimensionality of the LOT-Revised, Mehrabian and Ljunggren (1997) used both exploratory and confirmatory factor analysis techniques that yielded one factor. They found a correlation of  $-.56$  ( $-.82$  when corrected for attenuation) between the two dimensions, and concluded that this fact provided evidence for unidimensionality.

Lai et al. (1998) also used confirmatory factor analysis with a Hong Kong Chinese sample and found that their adapted version of the LOT-R (CLOT-R) was best represented by a one-factor model. On the other hand, Burke et al. (2000) contrasted the LOT-R with the optimism/pessimism scale (OPS; Dember et al. 1989), and demonstrated that the two scales were not measuring similar constructs and found only a modest correlation between GrLOT-R

optimism and GrLOT-R pessimism (-.30), concluding that the two dimensions were relatively independent. A similar modest correlation was also found in the present study (.345) between optimism and pessimism, but considering the fact that when we compare the Pearson correlations of the total and subscales of GrLOT-R with the other demographic and outcome variables the total score seems to have a bigger p value in more correlations makes us think that the use of the total score is a better solution when the measurement of quality of life is involved in the study.

Nevertheless, splitting the GrLOT-R into one optimism and one pessimism subscale of 3 items each is not without problems. The most obvious one is low reliability of the two indices, which results in unreliable estimation of correlations between the CLOT-R and measures of other variables such as symptom reporting. This does not appear to be a problem in research among Western samples since Cronbach alphas as high as 0.68 and 0.80 have been reported for these two indices (Chang & Bridewell, 1998).

In the present study, positive correlations were found between optimism and health related quality of life, as was measured with instruments developed for adults.

These findings confirm earlier studies. The link between optimism and health related quality of life was much stronger for psychological factors such as anxiety and mental health, moderate for physical health and relatively lower for pain. Altogether, results from the current study indicated a link between optimism, which is viewed as a dispositional factor, quality of life and pain.

Furthermore results from regression analyses specify that optimism and pain intensity account for significant proportions of the variance in adjustment among health care professionals.

Analyses showed that optimism is a significant predictor of mental health in this sample. Optimism accounted for 35% of MCS12 scores.

Previous research suggests that cognitive predispositions such as optimism/pessimism may play a significant role in how a person copes with chronic illness and assesses his symptoms (Affleck, Tennen, & Apter, 2001). In addition, optimism/pessimism may influence health outcomes (Peterson & Seligman, 1984; Peterson, Seligman, Yurko, Martin, & Friedman, 1998; Peterson, Vaillant, & Seligman, 1988). For example, Affleck and colleagues (2001) found that the most optimistic asthma patients were least likely to take extra medication for worsening symptoms, whereas the most pessimistic asthma patients were more likely to vent distressing emotions.

Similar to these findings the statistical analysis of the present study when an independent sample's t-test was conducted to compare the optimism scores,

revealed that there was a significant difference for mobility and health care problems, with more optimistic professionals having less mobility and self care problems than more pessimistic ones (see table 4). These results indicate that more optimistic patients have less day life difficulties, thus they cope better with their musculoskeletal problem.

Similar results were found when Anova were conducted for pain or discomfort problems where more optimistic professionals had fewer problems than more pessimistic ones and less anxiety or depression problems.

In our opinion this is the first study to examine the nature of the relationship between optimism and health related quality of life in healthy adults with musculoskeletal problems in the work place environment. So, comparison of this study with previous work investigating the role of dispositional optimism as a predictor of treatment outcome can only be made in general terms because of the very different patient groups and means of assessing outcome used in the various studies. So, the present study's results differ from Kreitler et al., who found no association between optimism and self-rated health in sample of UADT cancer patients, although this was a cross-sectional study with a quite different indicator of optimism (one item) (Kreitler et al, 1993).

In total the main hypothesis of the present study was that optimism could be a significant predictor of both mental and physical dimensions of health related quality of life. Indeed optimism and pain (pain intensity and pain or discomfort problems) was found to explain a great deal of the variance of physical function (table 5 & 6), while optimism was the major predictor of MSC12 explaining the 35% of the variance. Similar to our findings prior research has suggested that dispositional optimism and pessimism may be linked to important physical and mental health outcomes. Optimism was also a statistically significant predictor of HRQL (MCS;  $b = 0.37$  and PCS;  $b = 0.30$ ), in a study investigating the relationships between optimism, hopelessness, partner support and HRQL in 155 cancer patients and their partners (Gustavsson-Lilius, Julkunen and Hietanen, 2007)

Finally it should be mentioned that dispositional optimism is thought to be a fairly stable personality characteristic (Scheier & Carver, 1985) but the fact that it has been found to be associated with social desirability and anxiety (Schweizer, Beck-Seyffer, & Schneider, 1999) suggests that it may not be completely stable in which case we may be assessing an aspect of anxiety or depression and/or similar constructs.

**Table 6. Multivariate regression analysis of PCS12, MCS12, EQ-5D index, and EQ VAS; standardized beta coefficients (n = 272 to 256) for quality of life measures with GrLOT-R subscales (optimism –pessimism) as explanatory variable.**

Variables in model		Euro5D VAS		PCS12		MCS12		Eyro5D Summary
		Model3	Model4	Model3	Model4	Model3	Model4	Model2
<i>Explanatory variables</i>								
Age		-,093	-,077	-,082	-,004	-	-	,089
N of kids		-,073	-,082	-,047	-,003	-	-	-
Absence days		-,008	,063	<b>-,145*</b>	-,074	-	-	,101
Years of working		,015	,071	-,079	-,046	-,071	-,040	,073
Musculoskeletal problem		<b>-,171*</b>	-,107	<b>-,256</b>	<b>-,189</b>	-	-	<b>,156*</b>
Marital status	Single	,054	,038	,045	-,046	-	-	-
	Married	-,058	-,041	-,088	-,069	-	-	-
	Divorced/widowed	<b>-,128*</b>	-,095	-,027	,028	-	-	-
Education:	Primary	,024	,027	-,094	-,069	-	-	-
	Secondary	<b>-,109*</b>	<b>-,128*</b>	-,041	-,070	-	-	-
	College-University	-,081	-,064	,083	,103	-	-	-
	Master- PhD	,048	,034	<b>,138*</b>	<b>,110*</b>	-	-	-
Problems with:	mobility	-	-,051	-	<b>-,202</b>	-	,033	-
	Self care	-	<b>-,104*</b>	-	-,029	-	-	-
	Usual activities	-	<b>-,177*</b>	-	<b>-,263</b>	-	-,060	-
	Pain/discomfort	-	<b>-,132*</b>	-	-,103	-	<b>-,199*</b>	-
	Anxiety/ depression	-	<b>-,191</b>	-	-,022	-	<b>-,256</b>	-

**Table 6. (Continued)**

Variables in model		Euro5D VAS		PCS12		MCS12		Eyro5D Summary
		Model3	Model4	Model3	Model4	Model3	Model4	Model2
Specialty	Nurses	-,032	,025	,028	,084	-,022	-,038	,065
	Nursing aid	,008	-,019	-,070	-,099	,021	,036	,001
	Other	,022	-,010	,048	,004	<b>,151*</b>	<b>,110*</b>	-,095
Optimism		<b>,158*</b>	<b>,111*</b>	,097	,005	<b>,174*</b>	,107	<b>-,240</b>
Pessimism		<b>,121*</b>	,090	,060	,061	<b>,255</b>	<b>,232</b>	-,084
Pain intensity		<b>-,283</b>	<b>-,153*</b>	<b>-,308</b>	<b>-,123*</b>	-,058	-,040	,363
Model R <sup>2</sup>		<b>,356</b>	<b>,449</b>	<b>,447</b>	<b>,580</b>	<b>,172</b>	<b>,250</b>	<b>,454</b>

*Note:* coefficients with  $p < 0.001$  are in bold type and coefficients with  $p < 0.05$  are in bold type with \*

Model 2: when entering into the regression model the 5 dimensions of Euro5D as controlling variables.

Items 1–5 (Mobility, Self Care, Usual Activities, Pain/Discomfort, Anxiety/Depression) are EQ-5D health states

EQ-5D Visual Analog Scale (VAS) rating of global health status (0–100)

The present results shows that even with the entry of anxiety or depression as explanatory variable in the regression models optimism still manages to be a significant predictor for all the quality of life variables.

Finally the limitations of this analysis need to be acknowledged. Although the sample was large and representative, there were potential biases in self-selection. The self-report nature of the data also limits the validity of the data. This analysis focuses specifically on women since the majority of the sample consisted of nurses and nursing aide staff, which is still considered an occupation for women in Greece and mostly women are working in this field.

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### Conflict of Interest

The authors declare that they have no competing interests.

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*Chapter 2*

## **A MIXED METHOD APPROACH TO OPTIMISM RESEARCH**

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### **ABSTRACT**

The aim of this chapter is to present optimism as a core component of positive health attitudes (PHA). This chapter describes, explores and explains the phenomenological and statistical relationships between optimism (O) and other health related constructs such as sense of coherence (SOC) and self-efficacy (SE). Four reliable and validated research tools were used to collect the data and also served as variables to operationalize PHA, namely Antonovsky's Sense of Coherence Questionnaire (SOC-29); Schwarzer & Jerusalem's Generalised Self-Efficacy Scale, (GSES), Health Behavior Inventory (HBI) and Seligman's Scale (SS). As a consequence, optimism's role and dynamics within PHA have been conceptualized. The following statistical procedures have been used: cluster analysis, REGW-Q test and Pearson's correlation ratio. The results indicate statistically significant differences ( $p < 0.001$ ) between these four variables/constructs: for example, from the statistical point of view it was concluded that the higher the level of optimism the better beliefs in SE.

A qualitative-hermeneutical approach to data analysis has been used. The interpretative-phenomenological perspective provides an effective positive self-explanation style in order to symbolize, learn from others,

plan alternative strategies, regulate individuals' motivation (through goal aiming notion and one's positive health expectations), behaviour and mood. It is argued that high O may affect one's self-reflection, essential for producing enduring cognitive-emotional change. Furthermore, a high O results in greater control over thoughts, feeling and actions, stress coping strategies, health behaviors and emotional well-being. Also, it has been proposed that increased O along with SOC may lead to an enhanced 'behavioural immunology' that leads to better health. A combined essence of these two models may lead to the situation in which stimuli from the outside and inside worlds have a more logical structure that can be predicted and explained, i.e. a global orientation that creates dynamic and persistent self-beliefs may be developed. All the research results from REGWQ tests, Pearson's correlation coefficient, cluster analysis and qualitative methods of data analysis suggest the existence of conceptual similarities between O, HB, SOC and SE and a new empirical-theoretical pattern. This pattern will further be discussed and developed.

## INTRODUCTION

There was a logical reason for continuing the author's previous research (Posadzki 2007a.b.; Posadzki et al. 2009 a.b.). First and foremost, the author hoped that his results will improve our understanding of optimism as a core component of health attitudes and that these data will contribute to the existing body of knowledge. It is suggested that optimism offers an opportunity for the individuals' to adopt healthier attitudes that can continue throughout lifespan. Therefore, within the scope of this chapter, firstly, the author will review research on optimism in a narrative manner. Secondly, he will introduce the reader to the general assumptions of the concept of sense of coherence (SOC), self-efficacy (SE) and health behaviors and these models' links with health. Consequently, positive health attitude will be conceptualized and then the most significant results of his previous studies presented. At the end of this chapter, the author discusses the theoretical and practical implications of the results, presents guidelines and proposes future investigations.

## OPTIMISM AND HEALTH: THE PSYCHOSOCIAL PERSPECTIVE

Optimism is linked to positive health outcomes, although its mechanism is largely unknown. Evidence supports two independent types of optimism: dispositional optimism (Carver and Scheier), which is similar to other personality traits, and explanatory optimism (Seligman), which affects an individual's interpretation of success and failure (Segerstrom 2005). Therefore, positive explanation styles may have complex effects on one's performance, promote subjective well-being and good health (Sumi 1997) through strategies to reduce negative mood (Brydon et al 2009; Segerstrom et al 1998), and decrease emotional exhaustion (Rioli & Savicki 2003).

Generally, individuals scoring high on optimism have better health outcomes, and when confronted with life-threatening illnesses, cope with the illness more effectively. Mosing et al. (2009) claimed that little is known about the sources of variation in optimism but they further suggested optimism's genetic background. Also, from the biological perspective, optimism may also affect individuals' health through counteracting stress-induced increases in inflammation response (Huan et al 2006), or higher numbers of lymphocytes and higher natural killer cell cytotoxicity (Segerstrom et al 1998).

### Optimism and Health Behaviors

From the 'physical perspective', it would be beneficial to mention that optimism is a significant predictor of positive physical health outcomes. Results suggested that optimism is associated with current healthcare behavior, healthy lifestyle and dietary habits (Jones et al 2008). A low level of optimism may indirectly affect proneness to cardiovascular death via unhealthy behavioral choices (Giltay et al. 2007). Optimism was also associated with no smoking, moderate alcohol consumption, brisk walking, and vigorous physical activities (women only), independently of socio-demographic factors and clinical condition. Physical health status was associated with optimism, independently of socio-demographic factors, clinical condition, negative affectivity, and body mass (Steptoe et al. 2006). Optimism and social support were positively associated with increases in physical health behaviors (K Harper et al. 2007). In a similar way optimism and positive efficacy expectancies appear to encourage self-care behaviour (de Ridder et al. 2004).

Other studies extended earlier findings of a positive relationship between optimism and health-enhancing behaviors and demonstrated that this relationship can be observed for general health habits as well as in the context of a specific health threat (Mulkana & Hailey 2001). On the contrary, however, pessimism was related to increased sedentary behaviors and usual activity (Taylor et al. 2004). The profile assigned to pessimists was characterized by cognitive, affective, motivational, and behavioral invariance, encompassing negative construals of the situation, giving up, and a focus on distress (Weber et al 2007). Also it has been reported that optimism was inversely associated with baseline anxiety, perceived stress (Hulbert & Morrison 2006), and depression (Cha 2003; de Moor et al. 2006; Makaremi 2000; Márquez-González et al. 2009), whereas pessimism was related to poorer mental health and general behavior, and greater impact on the family (Williams et al. 2009). The data also show that persons who have a pessimistic outlook on life are more frequent users of the medical and mental health care delivery systems (Colligan et al. 1994). Thus, optimists may reap health benefits partly through cognitive (less avoidant coping), and affective (less depression), and behavioral (proactive behavior) pathways (Ironson et al. 2005). On the other hand, the results showed a correlation between active coping and optimism. This is also congruent with Wrosch and Scheier (2003) who claim that dispositional optimism facilitates subjective well-being and good health, mediated by a person's coping behaviours (Wrosch & Scheier 2003). Both active coping and optimism were related to different dental health behaviors, which supports the comprehensiveness of optimism as a determinant for health (Wrosch & Scheier 2003; Ylöstalo et al. 2003a,b) despite the fact that analysis showed that five dimensions of Type A behavior, accuracy and persistence, speed and time pressure, desire for promotion, seriousness and organization, and workaholism were positively correlated with optimism (Hasan 2002).

## **Optimism and Social Support**

First of all, it has been stated that pessimistic participants were also more at risk for severe anxiety symptoms, sleeping problems, somatic problems, and problems in social functioning than optimistic control participants (van der Velden et al. 2007). Furthermore, pessimism predicted more child-reported anxiety symptoms and parent-reported social and academic deficits (Ey et al 2005). Consequently, it should be emphasized that both situational and

dispositional optimism were positively associated with baseline social and physical well-being (de Moor et al. 2006) and increases in psychosocial behaviours (K Harper et al. 2007). Other researchers declared that social support was associated with high self-esteem, which in turn increased optimism and was related to decreased depression (Symister & Friend 2003). They also proposed that disaggregating social support into subscales showed that both tangible and belonging support predicted increases in optimism (Symister & Friend 2003).

Ratings for optimism were positively correlated with those for social support and reciprocity and negatively correlated with those for interpersonal conflict (Sumi 1997; 2006). When couples engaged in a conflict, optimists and their partners saw each other as engaging more constructively during the conflict, which in turn led both partners to feel that the conflict was better resolved one week later. In a one-year follow-up, men's optimism predicted relationship status (Srivastava et al. 2006).

Increases in social network size predicted increased optimism (Segerstrom 2005, 2007) and vice versa, insofar as greater optimism was prospectively associated with greater increases in perceived social support over the course of a first semester of college. This contributed to the superior adjustment that optimists experienced (Brissette et al. 2002) and therefore perceived social support is an important resource for women with low optimism for example (Shelby et al. 2008). To some extent, this is congruent with Segerstrom (2007), who argued that dispositional optimism may be associated with growth of social and status resources by virtue of optimists' greater persistence and better performance. Conversely, resource growth may give people a more positive view of their future and increase optimism (Segerstrom 2007).

Optimism was significantly associated with the individuals' social, personal and goal commitment, higher self-esteem and lower ratings of loneliness (Montgomery et al 2003), and finally, from the socio-spiritual perspective, findings indicate that the relationship between intrinsic religiousness and life satisfaction and between prayer fulfilment and life satisfaction was mediated by optimism and social support (Salsman et al. 2005).

## **Mediative Role of Optimism on QOL in Clinical Settings**

Some studies have used multivariate regression analysis to create a model to identify high QOL and HRQOL that were most strongly associated with

optimism (Mannix et al 2009; Moyer et al. 2009; Petersen et al. 2008). In similar models, optimism was associated with higher levels of general health perceptions, vitality, and mental health, and lower levels of bodily pain (Achat et al. 2000). Correspondingly, higher optimism and less pessimism were associated with better mental health quality of life among Parkinson's disease patients (Gruber-Baldini et al. 2009). Optimism and self-efficacy significantly predicted emotional and physical well-being one year post-bone marrow transplant, controlling for age, gender, and treatment arm (Hochhausen et al. 2007). Encouraging positive expectations and facilitating social support may help women in public sector medical settings cope with the stressful demands of diagnosis and treatment of breast cancer regardless of race/ethnicity (Friedman et al. 2006). As hypothesized, affective social support mediated the relationship between optimism and distress in early-stage breast cancer survivors at baseline and 6 months (Trunzo & Pinto 2003).

## **THE CONCEPT OF SENSE OF COHERENCE AS A PART OF GENERALIZED RESISTANCE RESOURCES**

Based on the Second Thermodynamics Law (all living organisms can be characterized by the drive to entropy) Antonovsky (1979) created the notion of Salutogenesis. This model of health assumes that peoples' health can be situated at some place on the continuous 'ease-disease' scale, and is thought to be in opposition to pathogenesis: health as a primordial state.

Aaron Antonovsky created the concept of generalized resistance resources (GRR) (Antonovsky 1979). GRR are defined as each person's, environment's, or group's characteristics that facilitate effective coping with stress (1979: 100). GRR include physical, biochemical (resistance), material, cognitive, (knowledge, intellect, personality) and emotional factors associated with values, attitudes and interpersonal relationships, as well as macro-sociocultural qualities of individuals that enable them to efficiently avoid or conquer various kinds of stressors (Antonovsky 1987). An individual's level of GRR determines how s/he perceives the world that is being expressed via sense of coherence (SOC). According to Antonovsky, SOC is created by a few attitudes that form a kind of a 'behavioural immunology' that leads to health (Antonovsky 1997).

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## **SOC AND HEALTH**

SOC is thought to be an individual's characteristics related to a positive life orientation leading to effective coping strategies (Kouvonen et al. 2008). Antonovsky's research shows statistically significant correlations between strong SOC and health behaviours (Antonovsky 1993; Nyamathi 1991; Ogawa et al. 2001; Kamwendo et al. 1998; Abel et al. 1999; Freire et al. 2001; Cohen & Kanter 2004; Savolainen et al. 2004, 2005a, 2005b; Honkinen et al. 2005; Myrin & Lagerström 2006) that can further be mediated by the level of optimism. Since Shiber et al. (1990) have shown that perception of SOC can ease psychological disorders and reduce the risk of serious disability (Roth & Ekbal 2006; Chumbler et al. 2007; Gottberg et al. 2007; Lam 2007; Bergstein et al. 2008; Langius et al. 1992), optimism can further strengthen these mechanisms within the PHA and prevent anxiety, depressive symptoms, strengthen coping responses and consequently minimize perceived stress, posttraumatic stress and distress (Delago 2007; Gustavsson-Lilius et al. 2007; Nielsen et al. 2008), depression (Arevalo et al. 2007; Ying et al. 2007; Siglen et al. 2007; Roth & Ekbal 2006; Chumbler et al. 2007; Gottberg et al. 2007; Lam 2007; Bergstein et al. 2008), and anxiety (Langius et al. 1992; Lam 2007).

## **SELF-EFFICACY AS A CORE COMPONENT OF SOCIAL LEARNING THEORY**

The concept of own efficacy that enables individuals to symbolize, learn from others or plan alternative strategies is based on Bandura's (1977) Social Cognitive Theory and cooperates with goal aiming notion and one's expectations. It is suggested that this concept regulates individuals' motivation, behaviour, and mood (Bandura 2004).

Self-efficacy (SE) refers to people's beliefs about their capability to exercise control over the events affecting their lives. SE can also be thought of as the ability to organize and execute the courses of action required to manage prospective situations (Bandura 1989, 2004; Bandura et al. 2003). SE beliefs are concerned with judgment about what one can do with whatever skills one possesses (Bandura 1986) and has a complex effect on task performance. This capability is thought to be an insight or self-awareness that is essential for producing enduring behavioural change (Bandura 1977, p.4). This reflection is

thought to be a unique human capability that enables individuals to control their thoughts, feeling and actions, and therefore might be particularly useful in various, e.g. stressful, life events.

## **SE AND HEALTH**

Morowatisharifabad & Shirazi (2007) point out that SE has an indirect effect on health behaviours. Also, SE may be used as a sole predictor of health behaviours such as exercise performance, cardio-respiratory fitness, weight loss, alcohol consumption and oral health (Bandura 1997; Basak et al. 2005; Hepler & Chase 2008; Motl et al. 2005; Morris et al. 2008; Oei et al. 2007; Takase 2007; Rodgers & Murray 2007; Snook & Motl 2008; Warziski et al. 2007; Zalewska-Puchala et al. 2007), and optimism may further mediate these health behaviors. Some studies indicate that a belief in SE enables individuals to cope with stress (Bandura et al. 1988); prevent depressive symptoms and lead to mental well-being (Weng et al. 2008); increase medication adherence (Sacco et al. 2007); and perceptions of health (Reece & Harkless 2006). SE is a significant factor that influences symptoms of stress (Han 2005), and depression (Makaremi 2000). It may have a direct positive effect on pursued goals and achievements (Carroll et al 2008; Kaufman et al 2001; Mavis 2001; Vrugt et al 2002) and can be used to predict motivation and learning (Schunk 1989). SE may also contribute to both psychological and interpersonal health-related motives (Shen & Xu 2008; Wright et al 2005), and behaviours (Bebetsov et al 2002) and can predict unhealthy and addictive behaviours (Lin et al 2008) such as smoking and heavy alcohol drinking (Cho 2006).

## **HEALTH BEHAVIORS**

There is a plethora of positive health behaviors that can be found in the literature, e.g., seat belt use, vitamin intake, hours of sleep per night (Ebin et al 2001), physical activity, diet, and non-smoking (*Gordon-Larsen et al. 2003*), eating a low-fat diet (*Millar & Millar 1993*), spending quality time with family/friends; engaging in spiritual or religious activities (*Andrykowski et al 2006; Andrykowski 2007*), obtaining cancer screens (regular health check-ups) (*Fillenbaum et al. 2007*), relaxation (*Beasley & Kittel 1997*) and stress

control (*Campbell et al. 2004*), health knowledge and refusal skills (*Cartland & Ruch-Ross2006*). These behaviors have been found to reduce mortality from many co-morbid conditions such as cardiovascular disease, stroke, depression, anxiety, and osteoporosis (*Elliott et al. 2008*), diabetes, hypertension (*Lewis-Moss et al. 2008*), cancer, arthritis, stroke, asthma, severe headaches, lower back pain, and neck pain (*Strine et al. 2005*), sexually transmitted infections (*Furniss 2000*); and promote longevity and better quality of life (*Newsom et al. 2004*). However, negative health practices that can contribute to the onset of these diseases such as substance use, risky sexual behavior (*Vereecken & Maes2006*), depression, and suicidal thoughts/attempts (*Kipke et al. 2007*), sedentary lifestyle (*Levesque et al. 2007*), television viewing (*Coleman et al. 1998*) and psychosocial risk-taking (*Felton et al. 1998*) are important.

There is a high number of psychological variables such as self-perceived health status, number of chronic illnesses, intentions, barriers, subjective norms, motivation, engagement, self-efficacy, attitudes, perceived behavioural control, self-identity; as well as socio-demographic ones such as age, gender, educational level, social and cultural background that explain health and health behaviours (*Ajzen 2001;Hagger & Chatzisarantis 2008; Li-Chun et al. 2004; Luzzi & Spencer 2008; Mason & White 2008; Rhodes et al 2006; Sandberg & Conner 2007; Wong & Mullan 2008*).

## METHODS

### Conceptualization of PHA

Unquestionably, sense of coherence (SOC) and self-efficacy (SE), level of optimism (O) and health behaviors (HB) as separate constructs have attitude-similar structures and relevance to overall health (*Antonovsky 1979, 1987; Eriksson & Lindström 2005, 2006; Schwarzer 1993*). Therefore, theoretically, when the above-mentioned constructs are combined on the conceptual level with one another, they may have a positive effect on the individual's health and create so-called PHA. Following these arguments positive health attitude (PHA) was conceptualized as a 'cluster' of four separate constructs such as O, SOC, SE and HB (*Posadzki et al 2009a.*). Therefore, a subjective ability to express one's self through optimistic thought patterns, increased perception of Universe's logic, ability to control own feelings, emotions and behaviours in a

constructive way is PHA. A conceptualization of PHA was grounded in the qualitative research paradigms and therefore, this approach offers a range of epistemological, theoretical and methodological possibilities for knowledge building that can be unique in content, focus, and form. Hence within the scope of this chapter PHA will further be explored, explained and described from the perspective of optimism.

## **Operationalisation of PHA**

Participants completed four research questionnaires in the following sequence:

### ***Generalised self-efficacy scale (GSES)***

Based on Bandura's Social Cognitive Theory and the concept of SE, Schwarzer & Jerusalem (1995) created the so-called generalised self-efficacy scale (GSES) to measure individuals' SE. In this research tool Cronbach's alpha coefficient is 0.85, the standard error of the measure equals 0.24 and reliability using the test-retest method is 0.78 (Juczynski 2001). Theoretical accuracy was obtained due to high correlations with self-appraisal scale, self-acceptance and optimism. We decided to select this research tool because an individual's perception of his or her SE may suggest a general belief about his/her role in health-related situations (Schwarzer 1993, Schwarzer & Jerusalem 1995; Schwarzer et al 1997a, 1997b). Furthermore, the perception of health SE enables individuals to control and regulate their cognitive health-related patterns, feelings related to health and health-related behaviours (Bandura et al 2003; Bandura & Locke 2003).

### ***Seligman's scale***

Martin Seligman is considered the creator of the learned helplessness concept (Seligman 1993). He developed this idea and a new concept of learned optimism (Seligman 1997) was accepted in the scientific world. In Seligman's concept, a scale to measure an individual's O has been created (Colligan et al 1994). Theoretical validation of this scale has been obtained and high correlations with SE confirmed (Carifio & Rhodes 2002; Scholler et al 1999; Taylor et al 2004). This research tool was chosen because O may influence own well-being through avoidance of negative explanation styles (Carifio & Rhodes 2002; Seligman and Csikszentmihalyi 2000, Seligman et al 2003).

Furthermore, positive explanation styles may be associated with positive emotional patterns and affect thoughts and behaviours (Bedi & Brown 2005). It has also been suggested that positive explanation styles can affect people's health during their lifespan (Seligman 1993).

### ***Antonovsky's sense of coherence questionnaire (SOC-29)***

The SOC Questionnaire (SOC-29) was created by Antonovsky in 1983 to measure individuals' belief in the unity and logic of the world. It is based on the concept of generalised resistance resources and is deeply rooted in the salutogenic model of health and disease that assumes a lack of balance as the organism's primary state (Antonovsky 1987, 1997). In this research tool the Cronbach alpha coefficient is between 0.85 and 0.91. In order to achieve theoretical accuracy the procedure of deciding which item is directly related to the SOC concept was used (Antonovsky 1993; Koniarek et al 1993). This research tool was chosen because the SOC scale seems to be a reliable, valid, and cross-culturally applicable instrument to measure how people manage stressful situations and stay well (Eriksson & Lindström 2005). Additionally, it has been suggested that people with a high SOC live longer and have better strategies for coping with stress (Antonovsky 1979). These strategies may include emotional, behavioural and/or cognitive patterns and may exert a direct influence on health.

### **Health Behaviours Inventory (HBI)**

Juczynski developed this research tool in 2001. It enables researchers to measure individuals' health practices. The HBI's Cronbach alpha was 0.85: the standard error of the measure was 0.63 and the coefficient ratio based on the test-retest method was 0.88 (Juczynski 2001). Theoretical accuracy was obtained according to statistically significant correlations with GSES, O, and locus of control (Juczynski 2001). This research instrument was chosen because the concept of HB also includes emotional reactions, cognitive patterns, beliefs and expectations that, together, influence health (Gniazdowski 1990). HBs seem to be a manifestation of the individuals' knowledge about health and feelings, emotions and explanation styles. HBs are thought to determine human health and are 'observable', measurable components of attitude (Hollister & Anema 2004).

## **MATERIAL**

Following the qualitative conceptualisation process, the quantitative, cross-sectional survey was conducted in January 2006. A cluster sampling method was used to recruit a random sample of 396 college students (n=396) in Poland. They represented five different faculties, namely Physical Education, Physiotherapy, Tourism and Recreation, English Philology and Polish Philology. The mean age of the students was 20.5 years. This research was performed at the Academy of Physical Education in Krakow and the Colleges in Nowy Targ and Tarnow. Questionnaires were completed in class time. Before the students started filling in the questionnaires, the researcher gave explained the main aim and objectives of the study including information regarding research anonymity, harmlessness and voluntary attendance. The average time taken to complete the survey was 30 minutes. The four research instruments used are described in the following section.

## **QUESTIONS AND HYPOTHESES**

The author tested a research hypothesis that underpins the main assumptions of this study. These assumptions cover the interrelation of all presented variables/health related constructs: that is SOC, HB, O and SE (see Table 4), and the existence of a broader conceptual model-PHA (see Figure 1). The author also assumed that optimism as a key component of PHA will also mediate QOL.

From the phenomenological perspective the researcher asked whether and how PHA may influence the prevention of stresses, anxieties, depressions and poor biopsychosocial well being. It was also hypothesized that PHA can potentially influence individuals' subjective health and wellness, happiness, positive emotions, optimism, and life satisfaction, promote stress coping strategies and self-agency.

### **Statistical Analyses**

The Statistica® and SPSS® software packages were used to compute the existing correlations (Babbie 2001). The author carried out descriptive statistics and tested any differences in proportion, using exact methods for

discrete data. Preliminary assumption testing was conducted in order to test normality assumptions, linearity, multivariate outliers, group homogeneity, and multicollinearity, with no violation observed. Four statistical analyses were used to verify the research hypothesis as described below:

1. The cluster analysis to measure a hypothesis that underpins the main assumptions of this study.
2. The REGW-Q test was used to measure the relations between these four constructs.
3. Pearson's correlation ratio was used to investigate correlations between SOC, HB, SE, and O as separate constructs.
4. Factor analysis was used to explain the relationships among the variables.
5. Multivariate regression analysis was used to test the effect of independent variables on dependent ones.

## RESULTS

**Table 1. Proportions of categorical variables. (% diff means percentage difference of proportions and exact test was used)**

Variables	Total=396 N (%)	P-value (exact)	% diff, (95% CI)
<i>Sex</i>			
Male	262 (66)	-	-
Female	134 (34)	<0.0001	32% (22%, 42%)
<i>Social Background</i>			
Urban areas	257 (65)	-	-
City areas	139 (35)	<0.0001	30% (20%, 40)
<i>Faculty</i>			
English philology	60 (15)	-	-
Physical education	56 (14)	0.712	1% (-4%, 6%)
Polish philology	39 (10)	0.035	5% (0.3%, 10%)
Physiotherapy	118 (30)	<0.0001	-15% (-21%, -8%)
Tourism	123 (31)	<0.0001	-16% (-23%, -9%)

**Table 2. Distribution of variables in the measured sample**

Variable	N	Mean	St. Dev	Min	Max
SE	396	6.65	1.46	0.00	10.00
O	396	1.23	4.15	-10.00	17.00
SOC	396	130.40	20.42	66.00	203.00
HB	396	4.74	1.77	0.00	10.0

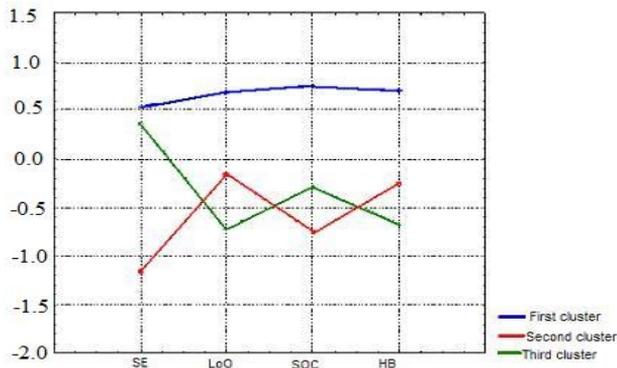


Figure 1. Cluster analysis (numerical data)

Table 2 shows that there were more females in the study than males and this difference was statistically significant ( $p$ -value  $< 0.0001$ ). There were more participants in the study who had an urban social background than those who had rural one and this difference was statistically significant ( $p$ -value  $< 0.0001$ ). There was similar proportions (30%, 31% respectively) in physiotherapy and tourism faculty both statistically significantly ( $p$ -value  $< 0.0001$ ) different from the proportions in the English philology being the reference faculty (all these are shown in Table 2).

In the cluster analysis, the four variables SOC, SE, O and HB were standardized through their transformation into z scores. As a result these variables obtained a mean of 0 and a standard deviation of 1. The most explicit results indicated three clusters that are described in the following paragraphs. The first cluster (blue line) represents students who obtained relatively high intensities of all four variables – approximately 0.5 standard deviation above the mean scores (Figure 1). The second cluster (red line) represents those who showed low SE, a moderate O and HB and a poor sense of coherence. The

third cluster (green line) represents individuals with a high level of SE, a moderate sense of coherence and low scores in Seligman's Scale and HBI. The analysis of variance showed that for each variable the results differed significantly between clusters ( $p < 0.001$ ).

**Table 3. Distribution of HB in the measured sample (data in numbers and percentages)**

	Health behaviours						Total	
	Low scores		Medium scores		High scores		N	%
	N	%	N	%	N	%		
Total	174	43.74	157	40%	65	16.26	396	100,00

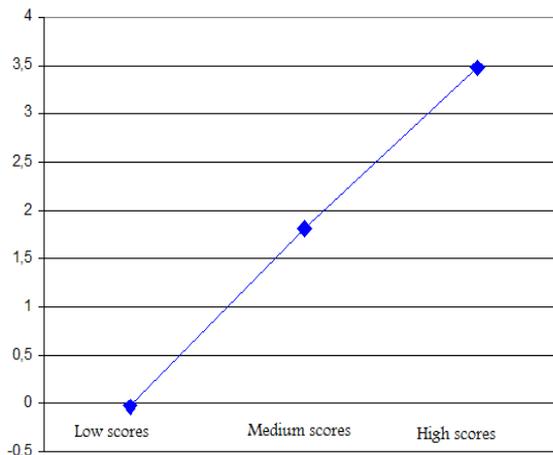


Figure 2. Relations between health behaviours and level of optimism (REGWQ test)

A more detailed analysis using the REGWQ test revealed further statistically significant differences ( $p < 0.001$ ) between variables. In these analyses the individuals were divided into three equal groups according to the results they obtained using HBI. The largest group consisted of individuals who obtained the lowest scores in HBI (43.74% obtained 1-4 sten). The second largest group consisted of individuals who obtained moderate results in HBI (40% obtained 5-6 sten). Finally, the smallest group consisted of those who presented the highest results in HBI (16.26% obtained 7-10 sten) (Table 3).

The research revealed that the higher the HB, the higher the optimism scores (Figure 2).

Figure 2 shows a statistically significant difference between all three groups ( $p < 0.001$ ). The higher the O, the more positive behavioural patterns and vice versa; and the more beneficial the HB, the higher the levels of positive explanation styles were presented. Students with low O also have low scores in HBI, and these students differ significantly from their counterparts with medium scores in O and HBI. Additionally, the individuals with medium O and HB differ significantly from their counterparts with the highest scores in O and HB. The conclusion is that the higher the O, the better the HB, and conversely, the healthier behaviors were demonstrated, the higher the students' O was (Figure 2).

Pearson's correlation coefficient indicates that each of the four variables is positively correlated with the others (see Table 4). The value of this correlation is various, ranging from weak between SE and HB to moderate between O and HB and SOC.

**Table 4. Pearson's correlation ratio between the measured constructs**

	Optimism	The sense of coherence	Health behaviours
Self-efficacy	.22**	.45**	.17**
Optimism		.30**	.33**
The sense of coherence			.45**

\*\*  $p < 0.001$

**Table 5. Factor loadings for a five-factor model**

Variable	Factor1	Factor2	Factor3	Factor4	Factor5
Fac	0.1553	-0.0087	0.2612	-0.2830	-0.0937
Sex	0.1714	0.2183	0.0035	-0.1555	0.3043
Socback	-0.0469	-0.0348	-0.2898	0.2179	-0.0312
SE	0.2906	0.4425	0.1422	-0.0390	0.1247
O	0.3389	0.1754	0.0747	0.2330	-0.1383

FA was used to explain the relationships among the variables as expressed by their correlations or covariances. Of all variables we had, only 5 factors were retained in the model. Table 5 shows unrotated factor loadings of the

factors that were retained. The bold highlighted loadings represent big absolute loadings for each factor. From the perspective of this chapter, it is important to emphasize that faculty and O note high loadings in the fourth factor, and we call this factor as “positive explanation styles and faculty” factor.

## MULTIVARIATE REGRESSION ANALYSIS

Multivariate regression was used to test the effect of faculty, gender, social background, SE, O and SOC on each of the subscales of the quality of life (QOL) outcome. Table 6 below shows the results.

Faculty (Physical education, Polish philology, Physiotherapy all compared to English philology), SOC, and O had a significant effect on Energy vitality (EV). With respect to General Health (HP), we see SOC and O having a significant effect.

## DISCUSSION

Currently researchers from a variety of scientific backgrounds such as health & social sciences, medical sciences and humanities are interested in individuals' health and health attitudes (Ajzen 2001; Aronson 2008; Fishbein 1975; Zimbardo 1991). Previously, Grabowski (1999) examined health attitudes and found that this construct may be considered as an expression and externalization, or projection of introspection of persistent, creational, recreational or therapeutic dispositions, which are related to the body.

**Table 6. Multivariate regression results**

QOL outcome Subscale	Factor	Regression Coefficient	p-value	95% (Confidence Interval)
<i>EV</i>	<i>FAC</i>	-	-	-
	English philology	8.915	<0.0001	(4.782, 13.047)
	Physicaleducation	7.687	0.001	(3.305, 12.068)
	Polish philology	5.675	0.002	(2.142, 9.208)
	Physiotherapy	0.309	0.031	(0.029, 0.589)
	LOO	0.177	<0.0001	(0.118, 0.237)
<i>HP</i>	SOC			
	LOO	0.628	0.010	(0.149, 1.107)
	SOC	0.318	<0.0001	(0.216, 0.420)

He regards the body as an object of the health attitude that should be analysed holistically. Similarly, Gacek & Fraczek (2001) state that positive, intellectual and volitional approach toward diet; physical activity and emotional well-being can be indicators of health attitude. On the other hand the author's previous research suggests that SOC, SE, HB and O can all be regarded as indicators of PHA.

It is then argued that SOC can lead to more effective stress-coping strategies and may directly influence individuals' mental wellness and life quality through optimistic thought patterns. Also, optimism may further mediate SOC and improve ones' health and quality of life through decreased anxious cognition (Engelhard et al 2003; Erim et al 2008; Frommberger et al 1999; Ying et al 2007), stress (Buddeberg-Fisher et al 2000; Skirka 2000; Torsheim et al 2001) and social stress adaptive capacity (Surtees et al 2006). The results indicate that optimism may influence individuals' HB, i.e. the higher the O the more beneficial the health practices that are presented (Figure 2). Potentially increased O and HB may prevent or minimize the risk of depression. Explicitly, O could be used to promote students' increased health and well-being and prevent mental health disorders. Additionally, it can be suggested that increased O leads to better health through more effective stress-coping strategies, improved life satisfaction and QOL. Posadzki and his colleagues' research has been performed among healthy individuals (Posadzki et al 2009b.) and they suggested the potential mediative role of optimism on some dimensions of QOL namely energy vitality (EV) and general health (HP). However, this is not similar with the results obtained by Achat et al. (2000) since they noticed that high optimism was not correlated to physical functioning, social functioning, or role limitations due to physical or emotional problems.

From the available literature no similar study on health attitudes has been conducted. Therefore it is difficult to extrapolate and compare the results from cluster, factor and/or multivariate regression analyses with others' studies.

### **Theoretical Implications of Such Combination**

Bandura (1977, pp. 4-5) writes that the value of a theory is ultimately judged by the power of the procedures it generates to affect psychological change. Moreover, effective theories must demonstrate predictive power.

Psychological changes might be achieved in the sense that optimistic explanation styles (when strengthened within PHA) may reinforce individuals' resources and coping strategies simultaneously. Moreover people with a high O might be regarded as more likely to engage in self-reflection concerning their own health. Also, individuals with a high level of self-reflection may be more likely to explore their own relationship with the external world through learned optimism.

PHA may have predictive power in the sense that efficacy beliefs might successfully enhance comprehension of an individual's current and future situation and his or her ability to give positive meaning to various impulses bombarding the mind (emotional, cognitive), and manage them more constructively.

Furthermore, in terms of PHA's internal consistency it may be assumed that a higher sense of comprehensibility may interact with and enhance cognitive and self-regulatory processes and strengthen optimistic beliefs. The greater his or her optimism, the more likely an individual is to engage in courses of action required to manage prospective situations and the higher sense of manageability (Ma) or meaningfulness (Me). But also, positive thoughts can resonate with comprehensibility (C), positive feelings with meaningfulness, and creative actions with manageability. It is worth suggesting that beliefs in meaningfulness can increase the sense of control over positive thoughts and emotions. The conclusion might be as follows: positive beliefs in own control over thoughts, feeling and actions may improve Ma, Me and C and optimism itself.

Certainly a high level of O and SE can give an individual the ability to classify the structure and meaning of the impulses approaching ones' lives. Increased SE and O can be used as a coping with stress strategy. Conversely, categorized impulses, and a strong SOC may in turn enhance perceived SE and O. Self-reflection regarding own optimism and emotional resistance may be useful when somebehavioural interventions are required.

## **Practical Implications and Guidelines**

Policy makers who create a wider health strategy might use a health model based on PHA concept. For instance, PHA with its' core component- O could be applicable to learning processes in schools and academies, support groups, or more widely- societies. This would enable people to acquire knowledge and

skills useful for coping with stress, strengthen their health resources, increase sense of control and enhance their well-being and life quality.

PHA as a consistent collective may be used in clinical practice, solely or in combination with other therapeutic modalities such as Cognitive-Behavioural Therapy, Gestalt Therapy, or humanistic approaches such as patient-centred therapy for patients' best benefits. PHA may also be combined with Protection Motivation Theory, Health Belief Model and Theory of Planned Behavior to strengthen its predictive and 'therapeutic' power.

Rehabilitation specialists, doctors, nurses, and other clinicians and their cardiology, orthopaedic, neurology pulmonology and pediatric patients could also benefit from such incorporation. Exercising control over thoughts, feelings and actions may be more feasible when one believes in the world's coherence and the logic of own existence possesses wisdom, life satisfaction and engagement.

The main practical implications of the PHA can also be analyzed from the coping strategy perspective. It can be suggested that optimism can be thought to be a key mediator in terms of planning the resources (cognitive-affective psycho-immunology) to be used. This would develop the individual's PHA and improve his/her hope, faith, and life satisfaction and general processes and state of health as a consequence. Surely, engagement in the process of giving a positive meaning into individuals' life events should include emotional SOC and SE. This would allow development of the individual's emotional resistance or flexibility and consequently promote social interaction via ability to love, forgiveness and other pro-social behaviour such as altruism, tolerance or empathy.

From the health promotion perspective, PHA can be used in the process of encouraging people to prevent disease, strengthening their health potential and reservoir, and for persistent self-development toward courage, resistance, aesthetical sensitivity or spirituality.

## **QUESTIONS THAT REMAINED UNANSWERED**

1. Can optimism be regarded as a continuum? Can this premise be accepted and assume that a person is neither fully optimistic nor fully pessimistic?
2. Can individuals' health be shifted nearer to the 'ease' end of the ease/disease continuum as a result of optimism?

3. PHA is based on beliefs, so the phenomenological nature of human faith needs to be deeply explored.
4. The PHA correlations of affective, cognitive and behavioural components.
5. Can pressure toward entropy be minimized to some extent through O, motivation towards self-organization (reversed entropy) and conscious control over own thoughts, feelings and emotions?
6. Can high O and SE strengthen physical, emotional, cognitive, spiritual, material resources to cope with stress more effectively?
7. How these three related concepts could be used in conjunction with one another?
8. What is the synergistic effect (if any) of for example, high self-efficacy, high optimism and high sense of coherence over and above their main effects?

## CONCLUSIONS

This chapter aimed to explore, explain and describe SOC, HB, SE and O from the statistical and phenomenological perspectives. The research hypothesis assumed that there are correlations between these variables. Simultaneously, the existence of a broader theoretical construct was hypothesized and the key role of optimism was presumed in this model. It is suggested that the empirical basis of the verification of the hypothesis indicates positive correlations between all four constructs (Table 2). Based on these correlations and the results of the cluster analysis, a concept of positive health attitude can be formulated (see Figure 1, first cluster). Increased O, SOC, SE and HB in the first cluster and positive correlations between these may be interpreted as positive health attitude. The author also claims that statistically significant differences between variables ( $p < 0.001$ ) (see results of the REGW-Q test in Figures 3 and 4) confirm the research hypothesis. More precisely, increased O as a possible indicator of PHA is significantly associated with the other variables that create this construct such as HB or SOC. Mediative role of optimism on QOL was partially confirmed.

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*Chapter 3*

## **GENETIC INFLUENCES ON OPTIMISM AND ITS RELATIONSHIP TO MENTAL HEALTH**

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### **ABSTRACT**

Optimism can be defined as positive generalized outcome expectancies and has been shown to act as a protective factor against somatic and mental health problems. Numerous studies report an association between optimism and enhanced coping strategies, lower levels of distress and depression, lower risk of mortality, slower disease progression, and better psychological adjustment to a diagnosis and treatment of a severe disorder. Although these findings indicate an important role of optimism on well-being, very little is known about the origins of individual differences in optimism. Due to its predictive value for well-being, happiness, life-satisfaction, and mental and somatic health, optimism merits special attention. Especially from a public health

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perspective it is attractive to explore the construct of optimism and its relationship to health in order to possibly develop positivity enhancing intervention. It has been proposed that positive and negative experiences throughout childhood and adolescence influence an individual's optimism level. However, more and more studies find that genetic factors may play a significant role in personality traits such as optimism. To date few studies have investigated the genetic and environmental influences on variation in optimism, most of these studies using a very small sample size. Here we review the literature exploring the genetic architecture of optimism and its' covariation with health variables. Additionally, we extend our recent investigations of optimism in an Australian Twin Sample (Mosing et al. 2009) by examining the relationship between neuroticism, optimism, and mental health, in order to better clarify the relationship between optimism and health.

## INTRODUCTION

Optimism has been shown to be a stable dimension of personality related to constructs such as depression, hopelessness, self-esteem and locus of control. Research indicates that optimism is a significant predictor of positive health outcomes (Rasmussen, Scheier, & Greenhouse, 2009) and that it may be a protective factor against mental as well as somatic health problems (Atienza, Stephens, & Townsend, 2002; Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004; Kubzansky, Sparrow, Vokonas, & Kawachi, 2001; Maruta, Colligan, Malinchoc, & Offord, 2002; Peterson, Vaillant, & Seligman, 1988; Scheier & Carver, 1985, 1987, 1992; Scheier, et al., 1989; Seligman, 1991; Taylor, 1989). Optimistic, compared to more pessimistic individuals, seemed to cope better with the diagnosis, progress, and treatment of disorders (Nes & Segerstrom, 2006) such as heart disease (Fitzgerald, Tennen, Affleck, & Pransky, 1993; King, Rowe, Kimble, & Zerwic, 1998; Mahler & Kulik, 2000; Matthews, Raikonen, Sutton-Tyrrell, & Kuller, 2004; Rasmussen, Wrosch, Scheier, & Carver, 2006; Scheier, et al., 1989) or cancer (Carver, et al., 1993; Carver, et al., 2005; Johnson, 1996; Trunzo & Pinto, 2003). Optimism also has been found to be associated with lower levels of distress after diagnosis of Acquired Immunodeficiency Syndrome (AIDS), lower risk of mortality (Maruta, 2000), lower levels of depression (Seligman, Abramson, Semmel, & Baeyer, 1979), better psychological adjustment during pregnancy and post-partum, and may be a prenatal psychosocial predictor of higher infant birth weight (Carver & Gaines, 1987; Fontaine & Jones, 1997; Park & Gutchess,

2006; Rini, Dunkel-Schetter, Wadhwa, & Sandman, 1999; Taylor, et al., 1992). In addition, optimists report better physical functioning (de Ridder, Fournier, & Bensing, 2004; Fournier, de Ridder, & Bensing, 2002; Motivala, et al., 1999), fewer physical symptoms (Fournier, et al., 2002; Glazer, Emery, Frid, & Banyasz, 2002; Kurdek & Siesky, 1990; Lyons & Chamberlain, 1994; Motivala, et al., 1999; Northouse, et al., 1999; Scheier, et al., 1999), lower levels of pain (Atienza, et al., 2002; Costello, et al., 2002; Mahler & Kulik, 2000; Smith & Zautra, 2004), and are less likely to experience complications following coronary artery bypass surgery (Scheier, et al., 1999). Finally, pessimism has been related to disease progression in women with an abnormal PAP smear test (Antoni & Goodkin, 1988) in that optimistic women (measured before diagnosis) were found to have less severe subsequent atypical neoplastic growth in the cervix compared to pessimistic women. Although these findings indicate an important role of optimism on well-being, little is known about the origins of individual differences in optimism. Due to its predictive value on health variables, optimism merits greater study than has been conducted to date.

It has been suggested that the experience of success and failure in situations throughout life influences an individual's optimistic or pessimistic attitudes (Seligman, 1991). However, not only environmental but also genetic factors seem to explain a significant amount of variance in optimism (Caprara, et al., 2009; Mosing, Zietsch, Shekar, Wright, & Martin, 2009; Plomin, et al., 1992; Schulman, Keith, & Seligman, 1993), as other personality traits have been found to be influenced by genes (Bouchard & McGue, 2003; Fulker, Eysenck, & Zuckerman, 1980; Hoekstra, Bartels, Verweij, & Boomsma, 2007; Jang, et al., 2006; Koenig, McGue, Krueger, & Bouchard, 2007; Kupper, Denollet, De Geus, Boomsma, & Willemsen, 2007; Loehlin, 1992; Plomin & Nesselroade, 1990; Rebollo & Boomsma, 2006; Taub, 1998; Yamagata, et al., 2006). To date only four studies have examined the genetic basis of optimism (Caprara, et al., 2009; Mosing, et al., 2009; Plomin, et al., 1992; Schulman, et al., 1993).

## **The Classical Twin Design**

In the classical twin design the variance in traits and covariance between traits is partitioned into that due to genetic (additive genetic, A, non-additive/dominant genetic, D) and environmental (shared within twin pairs, C, and non-shared, E) influences. This is possible as A, C, D, and E influences

each predict different patterns of MZ and DZ twin pair correlations. MZ twins share all their genes and DZ twins, on average, only half their segregating genes. Therefore, a substantially larger MZ than DZ twin correlation (the intra-pair correlation in a particular trait) would suggest A influences, as a twin correlation of 1.0 would be expected for MZ pairs and 0.5 for DZ pairs if A was the only source of variance in a specific trait. A-influences reflect the additive effects of alleles of multiple genes. Additionally, twins growing up together share common (C) environmental influences such as their home, their social environment, and their parents, influences which contribute to twin similarity. If the DZ correlation is more than half the MZ correlation, this indicates that C effects contribute to individual differences in the trait of interest, whereas if the DZ correlation is less than half the MZ correlation non-additive genetic effects (D) are involved. D influences comprise interactions between two alleles at a locus (dominant) or interactions between genes at different loci (epistasis). Finally, E is the variance in a trait caused by unshared environmental effects or unique experiences, influences that make the twins different, and also includes variance due to measurement error. As MZ twins share not only their entire common environment but also all their genes, a twin correlation smaller than 1 indicates E effects on the trait measured. A limitation of the classical twin design is that C and D cannot both be estimated in the same model, as they are confounded. Another fundamental assumption of the classical twin design is that trait-relevant environments are similar for MZ and DZ twin pairs (Kendler, Neale, Kessler, Heath, & Eaves, 1993).

In the same way as for variance in a single trait, the covariance between two or more traits can be partitioned into A, C, or D, and E effects utilizing the cross-twin cross-trait correlations. In this way the genetic correlation between two traits (the overlap in the genetic variation of traits) can be calculated.

## **Twin Studies on Optimism**

For a short overview of genetically informative studies on optimism see Table 1. Schulman et al. (1993), the only study solely exploring heritability of optimism (not in combination with other traits), measured optimism with the Attributional Style Questionnaire (ASQ), a self-report measure of explanatory style for bad and good events, in a small sample of 115 MZ and 27 DZ twin pairs (mean age 33). The MZ correlation was significantly higher (0.48) than the DZ correlation (0.00), suggesting a substantial genetic influence on optimism. However, the twin correlations were not further partitioned into

environmental and genetic influences. These findings should be treated with caution as a DZ correlation of zero is incompatible with a genetic model and could be explained by either a lack of power due to the small sample size or by unequal environments, meaning that the MZ environment somehow makes the twins more alike in the trait of interest while the DZ environment breeds differences.

Another study (Plomin, et al., 1992) exploring the heritability of optimism as well as its relationship to mental health in a slightly larger sample of 500 twin pairs with a mean age 60.7 years ( half of them reared together and half reared apart) used the Life Orientation Test (Scheier & Carver, 1985) (LOT). The LOT, similar to the ASQ, measures generalised outcome expectancies and, essentially, optimism and pessimism. The LOT has been shown to be a consistent measure with reliability ranging between 0.76 to 0.79 (Scheier & Carver, 1985). Heritability for optimism and pessimism was 0.23 and 0.27 respectively. Plomin et al. (1992) also reported significant D and C influences on optimism but not pessimism. Phenotypic correlations between optimism/pessimism and the four mental health measures (depression, life satisfaction, paranoid hostility, and cynicism) employed were substantial, and 0.54 on average. Multivariate genetic analysis implied that shared genes contributed considerably to these associations between optimism/pessimism and the mental health measures, with genetic factors being responsible for about half the phenotypic correlation with cynicism and hostility and about a third of the correlation with depression (Plomin, et al., 1992).

A more recent study (Caprara, et al., 2009) investigated the genetic and environmental architecture of optimism and its covariation with self-esteem and life satisfaction in a (also relatively small) sample of 251 twin pairs and 177 single twins aged 23-24 years also using the LOT. However, contrary to Plomin et al. (1992) who scored optimism and pessimism separately, the LOT was scored as a bipolar scale with a low score indicating pessimism and a high score indicating optimism. Heritability of optimism was reported at 28% with a genetic correlation of 0.83 between self-esteem and optimism and 0.87 between life satisfaction and optimism indicating that the amount of overlap among the set of genes influencing optimism and the two other traits is remarkable. As in Schulman et al. (1993) the variance in and covariance between the traits was not partitioned further into C and E influences.

Finally, the largest study to date (Mosing, et al., 2009) measured optimism, mental, and self-rated health in 1247 twin pairs and 561 single twins aged between 50 and 94. The study revealed that 36% of the variance in optimism could be explained by genetic influences with the remainder being

due to E influences. Again, most of the covariance between the optimism and the two health measures was due to genetic overlap, indicating that (in older adults) genes predisposing to high optimism also predispose to a better mental and self-rated health. Furthermore, though not significant, there was some indication of sex-differences in the genetic architecture of optimism, with genetic influences accounting for a substantial part of the variation in and covariation between the variables in females, while in males most of the variation and covariation was largely due to C and E influences. For that reason, the study was expanded by pooling the data from the Swedish sample used in Plomin et al. (1992) with the Australian data. Despite the increase in sample size (approximately 800 additional twins), the sex-differences remained non-significant. It is noteworthy though, that the increase in sample size did not change the twin correlations and parameter estimates but considerably tightened the confidence intervals, indicating a consistent pattern across the two studies, strongly suggesting that there may indeed be sex-differences, with the traits being more heritable in women than in men (Mosing, Pedersen, Martin, & Wright, submitted).

## **Optimism and Neuroticism**

It has been shown that there is considerable conceptual and empirical overlap between optimism and neuroticism (Scheier, Carver, & Bridges, 1994; Smith, Pope, Rhodewalt, & Poulton, 1989). Neuroticism, or negative affectivity, is a broad stable dimension of personality referring to individual differences in negative emotional response to frustration, loss, and threat, and is operationally defined by negative emotions including sadness, irritability, worry, anxiety, guilt, and anger, as well as associated cognitive and behavioral characteristics such as low self-esteem, preoccupation, vulnerability, self-consciousness, hostility, and insecurity (Costa & McCrae, 1992; Goldberg, 1993). Heritability of neuroticism has been estimated to be between 43% and 60%, peaking in early adulthood and gradually declining with age, somewhat slower in females, resulting in a slightly lower heritability in males in later adulthood (Gillespie, Evans, Wright, & Martin, 2004; Keller, Coventry, Heath, & Martin, 2005; Lake, Eaves, Maes, Heath, & Martin, 2000; Macaskill, Hopper, White, & Hill, 1994; Rettew, et al., 2006; Viken, Rose, Kaprio, & Koskenvuo, 1994; Wray, Birley, Sullivan, Visscher, & Martin, 2007). Neuroticism has strongly been associated with mental health; a meta-analysis (Malouff, Thorsteinsson, & Schutte, 2005) as well as later studies of the

relationship between neuroticism with Axis I mental disorders revealed that neuroticism is highly correlated with these disorders (Chien, Ko, & Wu, 2007; Khan, Jacobson, Gardner, Prescott, & Kendler, 2005; Weinstock & Whisman, 2006). Furthermore, there is evidence that neuroticism also is associated with a number of Axis II personality disorders, such as borderline, avoidant, dependent, schizotypal, paranoid, and antisocial personality disorders (Clark, Watson, & Mineka, 1994; Krueger, McGue, & Iacono, 2001; Saulsman & Page, 2004; Sher & Trull, 1994). These correlations between neuroticism and mental health may be due to overlapping genetic influences (Hettema, Neale, Myers, Prescott, & Kendler, 2006; Silberg, Rutter, Neale, & Eaves, 2001; Sullivan & Kendler, 1998). Indeed, twin studies show that a wide range of mental disorders shared approximately 30-60% of the genetic variance with neuroticism (Carey & Dilalla, 1994; Fanous, Gardner, Prescott, Cancro, & Kendler, 2002; Hettema, et al., 2006). No study to date has investigated the genetic overlap between neuroticism and optimism and mental health. It could be possible that the genetic correlation between optimism and mental health may be mediated by neuroticism. In this study we aimed to conduct a behavior genetic analysis of neuroticism, optimism, and mental health in order to explore the extent to which genes are shared by all three traits.

## METHODS

### Participants

The same community-based cohort as in Mosing et al. (2009) has been used in the present study, consisting of 3053 twin individuals between 50 to 94 years of age ( $M = 61 \pm 8.8$ ). This included 654 MZ, 593 DZ (351 same-sex, and 242 opposite-sex) twin pairs, and 561 single twins without a participating co-twin. Neuroticism data were available for 98% of the sample. The single twins were included as they contribute to the estimation of means and covariate effects. A multi-wave mail-out questionnaire, with consent implied by return, was sent out to twins from the Australian Twin Registry (ATR) (Hopper, 2002) between 1993 and 1995. The study was approved by Queensland Institute of Medical Research Human Research Ethics Committee. Aside from a range of demographic characteristics, health behaviour, and personality traits the questionnaire assessed neuroticism, optimism and mental health.

**Table 1. Summary of genetic informative studies on optimism and its relationship with health variables**

Reference	Sample size (twin pairs)	Mean age	Phenotype (measurement)	Major findings	Heritability
Schulman et al. (1993)	115 MZ 27 DZ	33 ± 11.1	Optimism (Attributional Style Questionnaire; ASQ)	MZ correlation: 0.48 DZ correlation: 0.00	Not reported
Plomin et al. (1992)	72 MZ reared apart, 126 MZ reared together, 178 DZ reared apart, 146 DZ reared together	61 ± 13.1	Optimism and pessimism (Life Orientation Test; LOT); Depression (CES-D); Life satisfaction (Life Satisfaction Index); Paranoid hostility and cynicism (Cook-Medley Paranoid Hostility and Cynicism Scale)	Significant C and D influences on optimism but not pessimism; shared genes explain a considerable amount of the covariation between optimism/pessimism and the mental health measures	Optimism: 0.23 Pessimism: 0.27
Caprara et al. (2009)	115 MZ 136 DZ 177 single twins	23-24 years	Optimism (LOT); Self-esteem (Rosenberg Scale); Life satisfaction (5-item Satisfaction with Life Scale);	Genetic correlation: 0.83 between self-esteem and optimism; 0.87 between life satisfaction and optimism	Optimism: 0.28
Mosing et al. (2009)	501 MZF, 153 MZM, 274 DZF, 77 DZM, 242 DZ opposite-sex, 561 single twins	61 ± 8.8	Optimism (LOT); Mental Health (General Health Questionnaire; GHQ) Self-rated health	An AE model fits best to the data. Most of the covariance between the traits due to genes. Indication of potential sex-differences in the genetic architecture of the traits.	Optimism: 0.36

Note. MZ = monozygotic, DZ = dizygotic, A = additive genes, C = shared environment, D = dominant genes, E = non-shared environment.

Zygoty was assessed with a standard questionnaire aimed to evaluate the degree of physical similarities during childhood. This method has been proven to be very reliable (Kasriel & Eaves, 1976; Martin & Martin, 1975). In 6% of the sample, we subsequently confirmed zygoty through genotyping micro-satellite markers across the genome (Cornes, et al., 2005). For further details of the sampling methods, zygoty determination and the questionnaire see Bucholz et al. (1998) and Mosing et al. (2009).

## Measures

**Neuroticism:** Twelve items of the short version of the Revised Eysenck Personality Questionnaire (EPQ-R; 48-items) were used to measure Neuroticism (Eysenck, Eysenck, & Barrett, 1985). Cronbach's alpha for this scale was .84 in accordance with findings in other studies (e.g. Eysenck, et al., 1985; Sato, 2005). Where less than three items (25%) were missing, the item score was substituted by the mean, if more items were missing the respondent's scale score was treated as missing. As the distribution of the Neuroticism scale was slightly skewed a square-root transformation was performed.

**Optimism:** The Revised Life Orientation Test (LOT-R) of optimism and pessimism (Scheier & Carver, 1985) consists of an equal number of positively and negatively worded items, ten items in total (three items assessing optimism, three items assessing pessimism, and four filler items), scored on a three-point Likert scale ("yes", "don't know", and "no"). It has been shown that the positive and negative halves of the scale can either be examined separately or the scale can be treated as one-dimensional (Scheier & Carver, 1985). We treated the data in the latter manner for the current study. To derive the scale score the item scores (1-3) of the six items were added up; a low total score indicating pessimism and a high total score optimism (Scheier & Carver, 1985), with values ranging from 6 to 18. Twenty-seven scores slightly below three standard deviations of the mean were winsorized. The scale was reflected as it was negatively skewed and, subsequently, a log transformation was applied.

**Mental Health:** Although the original version of the General Health Questionnaire (GHQ) consists of 60 items, the 12-item version (GHQ-12) has

also been shown to be a reliable and valid measure of severity and prevalence of psychological disorder (Bowling, 2005; Goldberg & Williams, 1988). The 12-item version was used here with participants rating present and recent complaints as “Better than usual” (0), “Same as usual” (1), “Less than usual” (2), or “Much less than usual” (3). The final scale score is derived by adding up the item scores (0-3). The total scale-score can range between 0-36, with scores around 11-12 typical, scores above 15 indicating distress, and scores above 20 suggesting severe mental problems. Sixty individuals scored higher than 21.8 (more than three standard deviations above the mean) and their scores were therefore winsorized. Because of skewness, a square-root transformation of the scales-score was used for further analysis. Please note that, unlike in our previous study (Mosing, et al., 2009), continuous as opposed to categorical scoring was used here for all variables.

## **Statistical Analysis**

The classical twin design was applied as described above. Data were analysed employing Maximum-Likelihood (ML) methods using the statistical package Mx (Neale, Booker, Xie, & Maes, 2006). Initially, a saturated model is fitted estimating all parameters (reflected by the degrees of freedom), and then progressively more restricted models are compared to the previous model. In maximum-likelihood procedures, the significance of particular parameters and specific hypotheses regarding those parameters can be estimated by testing the goodness-of-fit of a model to the observed data (distributed as  $\chi^2$ ) against the change in degrees of freedom.

Initially, we tested each of the variables for equality of means within twin pairs and across zygosity groups as well as for age and sex effects on the means and for equality of correlations of the twin groups. To explore the genetic relationship between neuroticism, optimism, and mental health a trivariate Cholesky-model was fitted. After estimating the relative magnitude of all parameters, we compared the fit of sub-models (dropping the paths with the smallest parameter estimates first) to test the significance of specific parameters and to determine the most parsimonious model explaining the phenotypic covariation between the three traits.

## RESULTS

### Preliminary Analyses

The means within twin pairs or across zygosity groups did not differ significantly ( $p < .05$ ) for all variables. Only neuroticism showed a significant sex and age effect, with women and younger individuals scoring high in neuroticism. Sex and age were therefore retained as covariates for neuroticism.

### Phenotypic, Partial and Twin Correlations

Table 2 shows phenotypic and partial correlations as well as twin correlations for the neuroticism, optimism, and mental health. Phenotypic correlations between the three variables were moderate but significant ( $p < 0.01$ ). However, partial correlations show that approximately half of the relationship between optimism and mental health is accounted for by neuroticism. The fact that the variables were treated as continuous variables as opposed to ordinal (as in Mosing, et al., 2009) seemed to have little effect on phenotypic and twin correlations. Twin correlations for MZ twins were significantly higher than for DZ twins for all three variables indicating genetic influences. While for Optimism the DZ twin correlations were half the size of the MZ correlations, for two other traits DZ correlations were less than half the MZ correlations, indicating dominant genetic effects (D).

**Table 2. Phenotypic and partial correlations (r) controlling for neuroticism and twin correlations for neuroticism, optimism, and mental health corrected for age and sex**

	Phenotypic r	Partial r	Twin correlations (95% confidence intervals)		
Neuroticism and mental health	0.48**	--			
Neuroticism and optimism	0.35**	--			
Optimism and mental health	0.29**	0.14**			
Zygosity	N pairs (range)	Neuroticism	Optimism	Mental Health	
MZ pairs	(517 – 624)	0.41 (.34, .47)	0.31 (.24, .38)	0.30 (.22, .37)	
DZ pairs	(506 – 568)	0.14 (.06, .22)	0.14 (.05, .22)	0.06 (-.03, .14)	

\*\* Phenotypic and partial correlations are significant at the 0.01 level (2-tailed).

### Genetic Modelling

As indicated by the twin correlations and from our past study on the same data set (Mosing, et al., 2009), C effects for optimism are negligible; therefore, an ADE model was modelled in the multivariate analysis. Heritability was 0.41, 0.32, and 0.30 for neuroticism, optimism, and mental health respectively. As shown in Table 3, D could be dropped without a significant deterioration in model fit. In order to prove the hypothesis that the genetic correlation between optimism and mental health can be explained by genes shared with neuroticism we tested whether either the genetic or the environmental cross-path between optimism and mental health could be dropped (Figure 1). As expected, while the non-shared environmental path could not be dropped, dropping the shared-genetic path did not cause a significant deterioration of model fit. The model could not be further reduced.

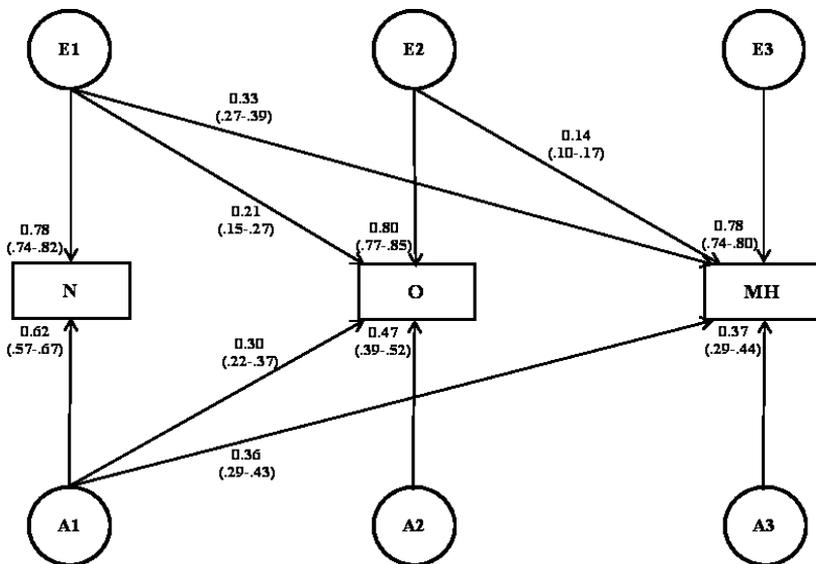


Figure 1. Most parsimonious multivariate model in which a Cholesky decomposition is applied to the genetic and environmental variance-covariance matrices with standardized path coefficients showing the relationship between Neuroticism (N), Optimism (O), and mental health (MH). Path coefficients can be squared to get the percentage of variance accounted for. The Cholesky factors have been decomposed into additive (A), and dominant (D) genetic and non-shared environmental (E) influences

**Table 3. Trivariate Cholesky-model fitting results for neuroticism (N), optimism (O), and mental health (MH) with the best fitting model in bold**

Trivariate model fitting results	-2LL	df	$\Delta$ -2LL	$\Delta$ df	p-value
Saturated ADE model	11960.31	8561			
AE model	11955.61	8567	4.70	6	0.58
Drop environmental path btw O and MH	11974.58	8574	14.27	1	<0.01
<b>Drop genetic path btw O and MH</b>	<b>11962.16</b>	<b>8574</b>	<b>1.85</b>	<b>1</b>	<b>0.17</b>
Drop specific genetic path for O	12003.34	8575	41.18	1	<0.01

## DISCUSSION

The present study aimed to investigate the genetic correlation between optimism and mental health and its relationship to neuroticism. Although the correlation between optimism and mental health was reduced, it remained significant after neuroticism was controlled for. This is in line with previous findings (Scheier, et al., 1994) and shows that optimism as measured by the LOT is a valid predictor of mental health and not only neuroticism under a different name. However, genetic modelling revealed that not only an AE model showed the most parsimonious fit but also that the shared-genetic influences between optimism and mental health were not significant, indicating that all genetic correlations between optimism and mental health can be explained by the set of genes influencing neuroticism as well as the two other traits. Additionally, there were two latent genetic factors specific to optimism and mental health respectively, indicating that there are specific genes influencing these traits, without affecting any of the other two traits. These findings show that the remaining predictive value of optimism for mental health after neuroticism has been controlled is entirely explained by non-shared environmental influences.

An explanation for the finding that, despite the MZ correlations being more than twice the DZ correlation all dominance effects could be dropped without significantly reducing the fit, could be that classical twin designs have low power to detect dominance effects (Martin, Eaves, Kearsley, & Davies, 1978; Neale & Cardon, 1992). Accordingly, in order to clarify whether dominance effects are responsible for the much larger MZ correlations compared to DZ correlations, a larger sample or an extended twin design would be needed.

Heritabilities were 0.41, 0.32, and 0.30 for neuroticism, optimism and mental health, respectively, leaving the largest proportion of the variance in liability to be explained by non-shared environmental factors. Previous studies have consistently attributed 43-60% (decreasing with age) of the variance in neuroticism to additive genetic influences with little evidence for shared environmental or non-additive genetic contribution to this trait (Gillespie, et al., 2004; Keller, et al., 2005; Lahey, 2009; Lake, et al., 2000; Rettew, et al., 2006; Viken, et al., 1994; Wray, et al., 2007) and, taking in account the aged sample used, this is in agreement with the findings of the present study. As expected, given the same sample (with a different scoring) was used, heritability estimates for optimism and mental health were in line with results of our past study as well as with findings of other studies (for further discussion see Mosing, et al., 2009).

## CONCLUSION

Numerous studies have shown that optimism has a remarkable effect on well-being and several health measures (mental as well as somatic). To date only four studies have explored the genetic architecture underlying individual differences in optimism and its positive effect on health, reporting heritability estimates between 23 to 36%. Additive genetic effects in combination with non-shared environmental effects seem the best explanation for the variation in optimism. Only one small study reported dominance effects for optimism. Similar findings have been reported for the covariation between optimism and several mental health measures with additive genetic effects having the highest influences and non-shared environmental effects explaining the remainder. Additionally, it may be noteworthy, though not significant, that there is some indication for potential sex differences in the heritability of optimism. Finally, it has been questioned whether the construct optimism is a predictor for health distinctive from neuroticisms or whether the correlation between optimism and mental health may be mediated by neuroticism. In the present study we could repeat the finding that optimism retains a predictive value for mental health, though the correlation halves, after neuroticism has been controlled for. Furthermore, we explored whether there is a distinctive set of genes explaining the covariation between optimism with mental health or whether these genes are shared with neuroticism. Interestingly, the study revealed that all genes shared between optimism and mental health were also shared with

neuroticism, indicating that the remaining predictive value of optimism for mental health after controlling for neuroticism is solely explained by non-shared environmental influences. It will be interesting to explore environmental effects influencing the environmental correlation between optimism and mental health but which do not influence neuroticism in future studies. These may also investigate further the influences of neuroticism on the relationship between optimism and somatic health and well-being, considering possible sex-differences as well as non-additive genetic effects by using a large sample size and an extended twin design.

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*Chapter 4*

**OPTIMISM: ITS BENEFITS AND  
DEFICITS ON INDIVIDUALS' BEHAVIORS**

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**ABSTRACT**

This chapter attempts to review and scrutinize the optimism concept and share these issues and evaluations with the readers. Although this chapter focuses on optimism mainly, it sometimes also refers to pessimism. Although the optimism phenomenon has a positive connotation, this construct has the potential to take different forms. Therefore, the changing characteristics of optimism according to time, situations, conditions and culture is emphasized. The benefits and deficits of optimism are discussed in terms of dispositional optimism, comparative optimism, unrealistic optimism, defensive pessimism and unrealistic pessimism by reviewing the studies about psychological well-being, physical well-being, academic life and life difficulties. Especially, the importance and vitality of carrying out studies sensitive to cultural differences is emphasized.

A room in the oncology department of a hospital... Two adult male patients, with the same diagnosis share the room... One of them, Daniel, is very anxious about the prognosis of his illness and frequently asks the doctors and the nurses about his condition and checks his test results — even though he does not understand much about them. He spends sleepless nights worrying about how his wife and children will cope with

their lives without him. Meanwhile the other patient, Tom, is not interested in the prognosis of his illness, though he had spent a considerable amount of time at the hospital. He often talks about himself as being a strong man and believes that any trouble sent by the Lord will be dealt with by Him.

## INTRODUCTION

Almost every moment of our lives is abundant with unexpected events. Any new situation encountered can be on a large scale such as a global economic crisis or on a small scale such as receiving a shopping discount while paying the cashier. Surprises can be pleasing such as receiving a phone call from a friend, whom we have not seen for a long time, on our birthday, or unpleasant such as finding our car seriously damaged when we return to the parking lot, or even upsetting such as losing all your relatives in an earthquake disaster. These situations can be complex such as beginning to study abroad as a university student, or they can include elements that can be relatively predictable such as wandering alone in an unsafe and uninhabited city at midnight.

Individuals can face some events and/or situations personally (such as diagnosis of a fatal disease or losing a job) or collectively (such as losing relatives and assets in a natural disaster or onset of a virus epidemic). These situations can include possibilities of success and satisfaction such as solving a problem, setting new goals, and personal development, or they can be upsetting and include possibilities such as failure, suffering and even death.

Despite such diversity, what makes individuals react very differently even in very similar situations and conditions? Or what makes individuals who live in very different cultural settings display very similar reactions in similar situations and conditions? Moreover, the reactions of an individual in different situations can be parallel to each other when evaluated as a whole. Why? It seems that the keys to understanding the reactions of individuals lie behind their interpretations of the problems. The point of views and expectations of individuals with regard to themselves, others and the world function as a source that shapes their reactions.

In the field of psychology, there are many theories and models focusing on explaining the forces that motivate individuals to action (e.g., Bandura, 1977; Peale, 1952; Rotter, 1957; Seligman, 1975, 1990). In conjunction with the situations, the expectations of the individuals show a continuity and

consistency, and this enables us to name these tendencies. Optimism and pessimism are regarded as the generalized beliefs such as supposing the best or worst will happen, and they stand for relatively steady individual difference variables that boost or decrease psychological state.

## THE CLASSIFICATION OF OPTIMISM

Our knowledge concerning optimism has improved with the studies of Scheier and Carver (e.g., Carver & Scheier, 1981, 1990; Scheier & Carver, 1985, 1988, 1992a) which focused on self-regulation mechanisms (for a review, see Carver & Scheier, 2001). When we investigate the literature on optimism, we can see various categorizations of optimism as well as the use of optimism on its own as a variable. For example, we can encounter classifications such as dispositional optimism, unrealistic optimism, defensive optimism, comparative optimism, learned optimism, situated optimism, spatial optimism, academic optimism, optimism for personal future and world's future in relation with the topic explored in addition to the optimism concept. Regarding the classifications about optimism, different aspects outshine as biases such as focus of dominant positive outcome expectancy on positive outcomes (dispositional optimism), seeing oneself luckier compared to others (comparative optimism), or ignoring the possibility of facing negative outcomes (unrealistic optimism). In the literature, terms such as positive thinking or illusion of control are used to explain optimism bias. Now let's have a closer look at the classifications that will be mentioned in this chapter:

*Dispositional optimism.* This is the tendency to think that one will go through good vs. bad events in her/his life. Dispositional optimism is more likely to expect good things rather than bad things will occur in the future, and it is related with positive effects even on physical health (Segerstrom, 2007). For example, Mert, a seventeen-year-old teen who will leave his family for the first time and start studying abroad, thinks that good things are waiting for him in his new environment such as being an honors student or having a girlfriend who will make him very happy rather than bad things and difficulties such as receiving academic warning or being dumped by his girl friend.

*Comparative optimism.* It is the tendency to believe that positive events are more probable to take place for her/him than for others, and negative events more probable for others than for her/him (Harris & Middleton, 1994). Let's continue with the college student example: Mert thinks that he is more

likely to be an honors student and have a very happy relationship than his peers while his peers are more prone to receive academic warning or be dumped by their girlfriends than him. When a group of students who would begin their university education were asked to guess the possibility to experience failure in education and disappointing relationships, they reported that they would be more likely to achieve academic success and happy relationships with the opposite sex compared to their peers whereas it would be less probable for them to face negative events such as academic warning or being cheated.

*Unrealistic optimism.* It is believed that the tendency to develop “a belief which suggests the future offers a lot of opportunities and no unpleasant events” (Taylor, 1989, p.6). Some people believe that “they are more likely to experience good things while less likely to suffer from bad things” (Weinstein, 1980, p.807). For example, Sarp rides a motorcycle to work. He does not wear a protective helmet and rides too fast... When he is warned about risking his life, he answers “Do not worry, nothing will happen to me”. Similarly, McKenna (1993) claimed unrealistic optimism is just a display of the illusion of control. Unrealistic optimism is also defined as a combination of optimism, comparative optimism and unrealistic optimism by Harris and Middleton (1994).

Mentioning the optimism phenomenon naturally brings together its antonym, the pessimism phenomenon. The studies of Weinstein (1980, 1982, 1983, and 1984) play an important role in the development of this concept. For a long time, the scores were used in the classification of the optimists and pessimists which were regarded as bipolar opposites. In fact, the effect of optimism and pessimism has complemented each other in the majority of the situations. However, since the 1990s, it was suggested that they are not complementary all the time. To exemplify, they may not have different correlates, so have the tendency to come out as separate factors. There has not been a definite resolution for this issue yet; therefore, researchers suggest that it is better to evaluate the effect of optimism and pessimism separately (Scheier, Carver, & Bridges, 1994). Even though the book itself and this chapter of the book focus on optimism, let’s have a brief look at some classifications related to the pessimism concept:

*Defensive pessimism.* It was mentioned that this is the tendency to use low expectations to manage anxiety in order for it not to become debilitating (Norem & Cantor, 1986, p. 1208). Defensive pessimism is centered on a specific part of life such as academic performance (for a review, see Norem, 2001). For example, in academic field, George is a defensive pessimist student

who expects to have and worries about negative consequences although he has been academically successful before. It is self-protective and defensive in two aspects. First, the anticipation of poor performance protects the person against failure if it actually happens. Second, the worry and concern to fail also encourages the academic optimists (with similar performance background) on tests.

*Unrealistic pessimism.* It is another type of pessimism refers to the tendency to consider oneself more susceptible to negative events than an average person. For example, James is a student who is going to start his college education believes that he is more susceptible to experience academic failure, be abused by his friends, and be disappointed compared to his peers. If we examine the thinking patterns and reactions of these people, we see that unrealistic pessimism is a reversed version of unrealistic optimism (Dolinski, Gromski, & Zawisza, 1987).

Looking at the types of optimism and pessimism, we see that we tend to process information distortedly in different aspects, and have the tendency of using this continuously while evaluating a situation. How can we label a person as an optimist or pessimist? How is optimism which has been discussed under different types and classifications measured? Are measuring types change according to optimism types and classifications?

## WAYS TO MEASURE OPTIMISM

Considering the ways of assessing optimism (and pessimism as well), it is seen that mostly self report Likert type instruments are used (e.g., Beck, Weisman, Lesler, & Trexler, 1974; Scheier & Carver, 1985). In the literature on optimism, there are many research studies regard to different types of optimism, especially dispositional optimism. Life Orientation Test (LOT) developed by Scheier and Carver (1985) is widely used in these studies. This scale includes nine items and four filler items.

The findings of research on optimism conducted with LOT have led to a discussion on whether this instrument measure neurotism or negative affectivity rather than optimism (Smith, Pope, Rhedewalt, & Poulton, 1989). This discussion started due to the fact that LOT is correlated more with various instruments that measure neurotism and negative affectivity than other optimism instruments (for a review, see Scheier & Carver, 1992a). As a result of this, Scheier, Carver and Bridges (1994) questioned what distinguishes

optimism from neurotism. They controlled the effects of trait anxiety, self-mastery, and self-esteem, observed the associations of optimism with both depression and coping, and modified the instrument. The final version of the instrument meets the validity and reliability conditions. It now contains six items and four filler items (LOT-R).

Departing from the psychometric properties of LOT and LOT-R, it is viewed that getting high scores on this instrument reflect optimism while low scores reflect pessimism. However, this view is challenged by some researchers who think that getting a low score on this scale does not necessarily mean the responder is pessimist, she/he may just have a low level of optimism (e.g., Scheier, Carver, & Bridges, 1994; 2001).

While discussions on the meaning of getting especially low grades continue, we see many research conducted with adaptations of LOT and LOT-R to different cultures in the literature (e.g., Aydın & Tezer; 1991; Lai, Cheung, & Yu, 1998; Türküm 2005, 2006; Wong & Lim, 2009). It is observed that the factor structures of this instrument show similarities in different cultures.

It is also observed that different types of optimism are tried to be measured with instruments other than optimism scales. In such measuring, the participants are given various situations and asked to rate their and others' possibility of facing these situations (Dolinski et al., 1987). Depending on the properties of the questions, data about different kinds of optimistic and pessimistic bias in the same group can be collected.

For example, dispositional optimism has been measured with instruments that include items on making risk guesses (e.g. seatbelt use, vehicular speeding, smoking) and self-defense behaviors (Khallad, 2009). Still another observation is the measurement of unrealistic optimism by guessing the possibility of facing a probable danger (i.e. reporting that the self was less likely than an average person to get infected with severe respiratory syndrome-SARS) (Li-Jun, Zhiyong, Usburn, & Yanjun Guan, 2004). Do optimism and pessimism which determine the way of information processing in different situations have any effect on our physical and mental health?

## **STUDIES RELATED TO THE EFFECTS OF OPTIMISM**

Optimism is regarded as an important psychological phenomenon which can help individuals to find ways to protect and increase their wellbeing. The

starting point of the research which questions the relationship of optimism with physical and mental health of individuals is the assumption that individuals who tend to develop optimistic expectations about future have better physical and mental health than those who do not. It is possible to categorize these studies as follows:

Some studies question the relationship of optimism/pessimism with some personal traits (e.g., Extremera, Duran, & Rey, 2009; Fernandez-Castro, Rovira, & Edo, 2009), physical well being (e.g., Scheier & Carver, 1992a), adjusting to serious health problems (e.g., David, Montgomery & Bovbjerg, 2006, Litt, Tennen, Affleck, & Klock, 1992), emotional/behavioral reactions given in case of a specific social problem such as unemployment (e.g., Lai & Wong, 1998) (e) while some others address the relationship between the optimism tendencies of individuals who are asked to estimate the possibility of facing life threatening situations (e.g., McKenna & Albery, 2001;) and possibility estimates (e.g., Norman & Brain, 2007), risk taking or self-protection (e.g., Türküm, 2006).

It is also possible to categorize the optimism studies in terms of using triggers, properties, and culture living in. Some of these studies reflect immediate evaluations whereas some shed light on its predictor effects, or the effects of optimist/pessimist properties of individuals on their quality of life (for review, see Aspinwall, Richter, & Hoffman, 2001), physical and mental health, academic life and professional life. A great majority of the studies are conducted with the individuals who live in western culture whereas limited studies are conducted with the individuals living in nonwestern cultures (e.g. Chai-Huei, Ying-Mei, & Lung, 2009; Lai, Hamid, Cheng, 2000; Türküm, 2005, 2006). Limited number of studies is also reflected cross-cultural differences about optimistic bias (e.g. Chang, 1996b; Chank et al. 2001; Khallad, 2009). Most of the studies focus on the direct effect of optimism while some tend to discover its mediation effect (Solberg Nes, Evans, & Segerstrom, 2009). The literature heavily focuses on the positive functions of optimism, but relatively a limited number of studies explore its possible negative effects (e.g. Dewberry, Ing, James, Nixon, & Richardson, 1990; Dolinski et al., 1987; Harris & Middleton, 1994).

When we evaluate the studies on the optimism phenomena as a whole, it can be argued that the earlier research has focused on the relationship between optimism and the state of being healthy. During 1990's the functions of optimism were being questioned both in hypothetical situations and shaping the reactions of real life events. With the 21<sup>st</sup> century the main focus of the

studies was to explain the culture relatedness and universality of optimism. Let's briefly look at these quite comprehensive studies.

The investigation of the relationship between the optimism/pessimism of individuals with their information processing styles yields the expected results. For example, individuals with positive problem orientation display optimism and positive affectivity whereas those with negative problem orientation have tendency of pessimism and negative affectivity (Chang & D'Zurilla, 1996). Another study on this topic revealed that the information processing has a significant effect on psychological adjustment, and optimism and pessimism adds a considerable amount of variance in this adjustment (Chang & Farrehi, 2001).

There are a bunch of study findings which suggest that dispositional optimism is effective on physical and psychological well-being. A few example of the studies which compare the optimistic and pessimistic individuals in terms of psychological well-being revealed that optimistic individuals adapt to important life transitions better (Aspinwall & Taylor 1992), respond better to in vitro fertilizations failures (Litt et al. 1992), recover sooner after a kroner artery bypass operation, and have better life standards six months after the operation (Scheier et al. 1989) compared to the pessimistic individuals.

The literature also focuses on the effects of optimism on mental health of individuals to a great extent (for a review, see Scheier, Carver, & Bridges, 2001). One of these studies (Chang & Bridewell, 1998) investigated the effect of irrational beliefs, optimism and pessimism on psychological distress-depression and anxiety symptoms, and the results revealed that only pessimism is effective on them. It is known that individual differences in traits such as optimism, pessimism and coping reactions contribute to the distresses experienced in stressful situations. For example in one of these studies (David et al., 2006), it was revealed that the distress levels experienced before cancer operation is related with optimism, pessimism and coping reactions; optimism and pessimism tendencies mediated the coping responses with distress. Optimism is also associated with mood, coping and immune system and shows difference in response to stress (Segerstrom, Taylor, Kmeney, & Fahey, 1998). The results of these studies seem to be confirmed the expectancies that optimistic tendencies affect both psychological and physical healthy aspects positively. Can we mention about the positive effects of optimism under various stressful life conditions?

The effect of optimism on risk estimates and reactions of individuals is also widely explored topic. For example, in case of a threat, the effects of

unrealistic optimism diminish. The reactions of the people who were exposed to different amounts of threat were examined (McKenna & Albery, 2001). This examination revealed that only those exposed to the most severe threat displayed differential risk estimates from those not experiencing threat at all. Differences were also seen in their self-reports of risk behavior. Risk perceptions were also examined in other domains, and the effect was found to be domain specific. It has also been indicated that there are differences in the perspectives of optimists and pessimists with regard to their life satisfaction in the past, today and in the future (Busseri, Choma, & Sadava, 2009).

A study which dealt with risk estimates and optimism, investigated the dispositional optimism tendency on psychological reactions of the women who had breast cancer cases in their families (Norman & Brain, 2007). It was found that dispositional optimism predict less anxiety and breast cancer worries after getting counseling as well as less anxiety and perceived risk at nine-month follow-up. Moreover, optimism was predictive of lower risk perceptions among women at high risk. Low dispositional optimism may be thought to be a risk factor for adverse reactions to high risk of breast cancer information.

Optimism is expected to have a positive effect on coping with not only changes in physical health but also social stress and preserving well-being. One of these compulsions is unemployment. In a study exploring this variable, optimism was observed to be an important personal source in coping with unemployment for Hong Kong Chinese women, but coping did not mediate the effect of optimism on health (Lai & Wong, 1998).

We may experience stress related with the social roles that are expected from us. For example, it is possible to face many stresses in every stage of life including the transition from adolescence to adulthood and higher education period. Higher education offers adolescents opportunities such as job, good income, social environment and prestige which will determine their life quality. However, it is an undeniable fact that university years represent the period in which many adolescents are expected to accomplish some functions such as coping with homesickness, establishing satisfactory relationships with their friends and the opposite sex, taking tests, perform the roles he is expected of and prepare to undertake their professional roles. This situation can mean compulsion to many adolescents.

Although mainly adults are included in optimism research, the relationships between especially the university students' optimism and pessimism properties and variables such as academic performance have also been investigated. Some of these studies were designed as longitudinal studies, so they give information about the effects of optimism on post graduation. For

example, in a study (Ruthig, Haynes, Stupnisky, & Perry, 2009), perceived academic control (PAC) as a mediator of optimism and social supports effects on first year students' psychological health was explored. Moreover, stress and depression were assessed as predictors of their grades. It was seen that optimism and support predicted less stress and depression while depression predicted lower grades. PAC was found to mediate the protective effects of optimism and support, and this offered more protection against poor psychological health.

In another longitudinal research with students in law department which lasted for more than ten years (Seegerstrom, 2007). It was found out that the law students who were more optimistic than others in their first year of university education had higher incomes ten year later; however, the income variable did not predict optimism. It was also found out that more optimistic students in their first years did not have larger social networks ten years later, yet increase in social network size predicted increase in optimism.

We see that the positive effects of optimism on psychological well-being are confirmed with research. Is this positive effect resistant to time? Does optimism give chance to predict the future status of individuals such as academic motivation, professional success and high income? These questions can be answered only with the findings of longitudinal studies. In a study (Cassidy, 2000) which lasted more than four years, we are informed about the relationship among social background, achievement, motivation, optimism and health. The 16-year-old participants were assessed for three times with two-year-intervals. The data showed that psychological well-being, self-rated health, achievement motivation and optimism are predicted by home background such as socioeconomic status, family size and parental employment. Achievement, motivation and optimism had a mediating role between home background and self-rated health and psychological well-being. Moreover, achievement and motivation seemed to undertake an important role in identity development.

When reviewing the related literature, we see that both the mediating effect of optimism on various variables and the variables that mediate the effects of optimism and pessimism have been investigated. To illustrate, in a study (Lopez, & Cunha, 2008) which explored the moderation function of hope on the outcomes of optimism and pessimism concerning proactive coping, it was found out that optimism explained proactive coping. Hope was thought to moderate the relationship of pessimism and passive coping. In particular, the level of hope did not have impact on individuals with low pessimism in terms of coping, but higher hope level decreased passive coping

in highly pessimist individuals. A deeper analysis also showed that this was caused by the moderating role of hope.

The studies mentioned so far confirm the expectation with regard to the fact that the optimism of individuals has positive effect on their quality of life and health. Doesn't optimism which bears positive expectations not grounded on objective facts have negative effects on individuals? In a study Solberg Nes et al. (2009) addressed the question, more than two thousand participants took surveys when entering the college and their academic records were obtained after their first year at college to investigate whether optimistic expectancies are linked with college retention. The findings indicated that dispositional and academic optimism were linked with less chance of dropping out of the college, better motivation and adjustment. Academic optimism also meant higher grades. Further, dispositional optimism predicted retention via motivation and adjustment, and this predicted retention in turn. However, academic optimism predicted retention via its impact on grades, motivation and adjustment.

As for pessimism, the studies on its aspects revealed interesting results. The findings indicate that when compared with optimism, pessimism brought big disadvantages in terms of physical and psychological health of individuals, coping with health problems or social factors, and the continuity of the efforts for reaching their goals. However, the studies conducted in association with some situations, especially non-hypothetic real life events showed that some types of pessimism yielded positive results in some situations. For example, defensive pessimism may not always be bad because defensive pessimists can develop low expectancies to cope with their anxiety focusing on the negative result possibilities although they have produced good works. Such a way of thinking is stated to help negotiate the risky situations (Norem & Cantor, 1986). Therefore, defensive pessimists motivate themselves for success. This thought is stated to work in short-term targets (Scheier & Carver, 1992a). The comparisons reflect that the short-term academic performances of defensive pessimists are not different from those of optimists. As for long-term results, defensive pessimists experience psychological symptoms and less life satisfaction (Cantor & Norem, 1989). These details of the research findings reveal the importance of the situations in which the limits of optimistic/pessimistic bias tendencies are well-specified for evaluation.

## CONCLUSION

Interest in the optimism phenomenon continues without interruption. It is nourished by the complexity of the concept and its interaction with other variables. The obtained findings can be used to understand human nature more, to create environments appropriate for his/her development and help to protect his/her well-being. These studies suggest that some types of optimism have positive functions in some situations considering health, motivation and continuous attempts of individuals. It is agreed that positive thinking helps individuals to deal with problems in a constructive manner, to keep their coping skills active and makes it easier to use their skills and to achieve their short- and long-term goals.

The studies questioning the interaction of optimism with various personal traits provide information on the positive functions of optimism in daily life such as that optimistic individuals have healthy habits which protect their life qualities. They provide important clues for planning professional support programs to protect well-being.

When an event occurs that damages daily life, such as losing one's job or facing a chronic illness, optimism is observed to have important functions such as using and keeping coping attempts or preventing the emergence of psychological problems. Based on these findings it can be concluded that positive thinking which involves the skills of dealing with oneself, other people and the world in a positive and constructive manner can be used as an instrument in crisis management.

Early literature on optimism mostly suggested that optimism brought and accompanied positive outcomes whereas pessimism yielded opposite outcomes. Although most of the literature on optimism reflects that positive thinking is functional and useful for individuals, the possible deficits cannot be ignored. In the late 1980s, the idea that optimism may also have negative effects started to be discussed (Dolinski et al., 1987; Scheier & Carver, 1992a; Scheier & Carver, 1992b). However, it is notable that the number of studies which focused on the deficits and limitations of optimism were limited. It was argued that optimism, especially unrealistic optimism, may cause individuals to become inefficient in coping situations (for a review, see Epstein & Meier, 1989; Tennen & Affleck, 1987; Weinstein, 1984). Scheier and Carver (1992a) accepted that this possible effect of being "too optimistic" could make individuals expect a desired outcome to happen instead of trying to realize it, but they also mentioned that there were not any findings which proved this

effect. Even though a long time has passed over this discussion, this topic is still uncertain.

It seems important to focus on the negative effects of optimistic bias as well as the positive functions of it. Some types of optimism such as unrealistic, comparative and also dispositional may increase the risk-taking behaviors and the tendency to avoid taking precautions. Even in situations where the individuals can control, their unrealistic optimistic tendencies may prevent them from putting sufficient effort into achieving their goals which in turn may have both a personal and social price. The situation gets more complex when the possible negative effects of unrealistic optimism interact with disruptive beliefs which stem from culturally supported fatalism and/or collectivism. Let's consider countries such as Pakistan, Chili, and Turkey which had experienced serious earthquakes. Would it be possible to think that optimistic bias—apart from the economic and educational weaknesses—is a factor for the deficiency of the people to take adequate precautions against a possible earthquake?

The literature lacks such studies that question these topics and inform us about the social psychological effects of optimism.

In the literature, the Life Orientation Test (LOT) has been used in several studies over the years. Translation of the test into different languages and its adaptation to different cultures (e.g., Aydın & Tezer, 1991; Lai, Cheung, Lee, & Yu, 1998; Türküm, 2005) help to get a more clear picture of the concept and to put the pieces of the optimism puzzle together. The studies such as meta-analysis of the studies employing the instrument (e.g., Andersson, 1996; Fischer & Chalmers, 2008) create a chance to answer the question whether this structure is universal. A meta-analysis investigation of optimism levels across 22 nations (Fischer & Chalmers, 2008) reflected that overall cultural differences were small, and greater individualism was associated with greater optimism. Nevertheless, researchers suggest giving importance to analyzing individuals' positive outcome expectations within specific societal contexts in further studies.

Although using a common scale (e.g. LOT or LOT-R) throughout the world enables us to make intercultural comparisons, the limitation of measuring a complex structure only with a single instrument should not be ignored. This situation can also be regarded as the limitation of the literature. Today the development and use of specific scales unique to culture, especially in non-western cultures is required by checking its concurrent validity with scales such as LOT or LOT-R.

There are also some limitations of the studies that question this phenomenon. One of these limitations is associated with the choice of situations which is used to assess optimistic tendencies. The situations/events are used as triggers to reveal the optimistic tendencies. When these trigger situations were examined more closely, it was seen that they were composed of relatively ordinary and hypothetical situations until the 1990s. In the early 1990s the trigger situations started to include common, powerful and immediate danger to explore the optimism tendencies of individuals. Immediately after the explosion of the atomic power station in Chernobyl, the study of Dolinski et al. (1987) and the study of Li-Jun et al. (2004), which questioned the individuals' beliefs about the possibility of themselves and the others' having SARS, serve as examples for the studies filling the gap in the literature. The findings of further studies on this subject will provide more detailed information about the positive-negative effects of optimism.

Another important limitation of optimism literature stems from the property of data group. Although, it is emphasized that optimism and pessimism as thinking bias cannot be separated from the culture lived in, which can affect it (Chang, 1996a; 1996b; 2001; Chang, Asakawa, & Sanna, 2001), a great majority of these studies were conducted in the western context. For example in western cultures, it is observed that since unrealistic optimists use also problem-focused coping strategies, they reach healthy and functional consequences especially when they have control over the results (Carver, Scheier, & Weintraub, 1989). In contrast, in nonwestern cultures emotion-focused coping styles are widely used (Sahin & Durak, 1994; Türküm, 2001). Moreover, the interaction of unrealistic tendencies with various coping strategies like emotion-focused coping has not been studied remarkably. The uncertainty about whether the findings obtained from Westerners in the early 2000s can be easily generalized to Easterners or not (Chang, 2001), seems to still continue.

It should be noted that the pattern of optimistic bias can be different in different cultures in terms of individualism/collectivism. Similarly a way of thinking which is functional in one culture may be a potential for inner/interpersonal conflict in another culture, so that it may create negative effects on psychological well-being. These opinions can be tested through questioning the formation of optimism and pessimism concepts in non-western cultures and conducting cross-cultural studies.

In the twenty-first century, the world is getting smaller due to factors such as communication, transportation, the use of technology, economic ties and dependency, and acculturation, so a local problem of a country may become

global in a very short time (e.g., swine flu, global crisis). The effects of the global events and the people's coping strategies with them will most probably be influenced by their optimistic tendencies. The era we live in necessitates the use of our information with regard to optimism and pessimism in planning and practicing protective-preventive health services. It is hoped that in the light of the information compiled so far, realistic planning which pays attention to the tendencies of optimism and pessimism will be functional in both solving the current psychological and social problems and preventing new ones from emerging.

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*Chapter 5*

**“IS OPTIMISM GOOD FOR YOUR  
HEALTH?” THE ROLE OF OPTIMISM  
IN ADOLESCENT LIFE AND HEALTH**

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**ABSTRACT**

Many previous studies suggest that optimism (that is, a generalized positive expectancy of the future) is related to better health outcomes, more adaptive coping, and health behaviors. These relationships may have a mutual reinforcing nature. In this study primarily we focus on the health protective nature of optimism in adolescence. In addition, while the health protecting effects of optimism have been already justified, we know much less about the background variables (such as parent – child relationship or socioeconomic status and school-related factors) influencing adolescent dispositional optimism. Previous findings suggest that some social factors, particularly social support may be positively related to optimism. Thus, in the first part of this study, we have examined which social variables of the two major contexts of socialization (family and school) predict optimism. Many investigations revealed that optimism was positively associated with positive health outcomes such as mental health and quality of life. Thus, in the second part of our research we have concentrated on detecting associations between optimism and a set of health variables, namely, depression, self-

perceived health (SPH), satisfaction with life (SWL) and substance use, such as alcohol consumption, smoking, and drug use. 881 secondary school students in Szeged, Hungary completed a battery of questionnaires that contained items on optimism (measured by the Life Orientation Test, LOT), health-compromising and health-enhancing behaviors as well as family and school-related protective factors. Results indicated that different forms of family support, parents' schooling, socioeconomic status (SES), and being happy with school significantly but slightly predicted optimism. Furthermore, optimism was positively correlated with satisfaction with life and self-perceived health and negatively with depression. In terms of substance use, optimism proved to be a protective factor against adolescent substance use except for smoking. In addition optimism was also a significant predictor of adolescent regular physical activity and diet control. We may conclude that findings support a mutual, reinforcing relationship between optimism and positive health outcomes. The negative correlation between optimism and depression is in consonance with previous results demonstrating the stress buffering nature of optimism in adolescent life. These findings are discussed in the light of the health protective power of optimism.

## INTRODUCTION

It is a well known fact that adolescents are more exposed to health-related risk factors and they are more likely to perform behaviors which may endanger their health than children before puberty (Henry, Slater, & Oetting, 2005; Milam, Sussman, Ritt-Olson, & Dent, 2000). Thus, investigation of factors which can prevent adolescent health-compromising behaviors and promote health-enhancing behaviors is essential. It seems that optimism might be one of them, although we know relatively little about the role of this protective factor in adolescence. Therefore, the purpose of this study was threefold: 1) to examine social predictors of optimism; 2) to detect a relationship between optimism and different measures of psychological adjustment, and finally; 3) to analyze its relationship with different health behaviors including both health-compromising and health-enhancing.

In the recent years a growing number of studies engaged in the relationship between optimism and health. In these studies, optimism was defined as a generalised expectancy of positive future outcomes (Scheier & Carver, 1985). Thus, optimism may have a regulatory role in maintaining and promoting health due to the power of positive thinking.

Several studies proved the positive relationship between optimism and different variables of health; among others, optimism in general may have a favorable effect on physical health. For example, Taylor, Kemeny, Reed, and Bower (2000) found that optimism was associated with better immune response and slower course of illness in a study of HIV infected men. Similar benefits were revealed for cancer patients as well: optimistic head and neck cancer patients were more likely to survive 1 year after diagnosis than pessimists (Allison, Guichard, Fung, & Gilain, 2003). Optimism may have a stress buffering effect on the level of immune system (for example, through higher natural killer cell cytotoxicity, and CD4+ T cell percentage) although it is true only in situations where stress is controllable. Under difficult, prolonged, uncontrollable circumstances optimistic strategies have a higher psychological cost (reflected in, for example, higher cortisol level) than benefit: in these situations optimistic persons tend to keep engaging in difficult stressors, and this can consume their resources (Segerstrom, 2005). Although functioning of the immune system is not in the focus of the current research, it is important to discuss how optimism can effect physical health. It seems that optimism might be associated with physical health through at least two pathways (Segerstrom, Taylor, Kemeny, & Fahey, 1998). The two mediators are the mood, and the behavior. These findings underline the need for further research into the relationship between optimism and behavior, particularly health-related behaviors.

Several studies showed the mutual connection between optimism and positive emotions. Additionally, optimism proved to be related to less negative mood. Segerstrom et al. (1998), for example, found that optimistic law students had less negative mood and better immune response (higher numbers of helper cells, and higher natural killer cell cytotoxicity) during exam period. Chang, Sanna, and Yang (2003) examined the possible link between optimism, pessimism, positive and negative mood, and psychological adjustment (e.g., depression, and satisfaction with life). Path analysis revealed that optimism was positively associated with positive mood and satisfaction with life, and negatively with negative mood and depression. Mood was considered as a mediator between optimism and psychological adjustments, although optimism was found to be a direct predictor of satisfaction with life, and depression as well. Extremera, Duan, and Rey (2007) also found that optimism predicted negatively depression, and positively satisfaction with life. Huan, Yeo, Ang, and Chong (2006) got similar results: adolescents' level of optimism had a negative association with academic stress. Lai (2009) also revealed the stress buffering effect of optimism among adolescent students:

distress increased to a less extent in students having high optimism scores when daily hassles rose. These findings underlie the effort of positive psychology to develop methods which can augment well-being, and psychological adjustment, and reduce depression by improving optimistic attitude, gratitude and positive thinking. Seligman, Steen, Park, and Peterson (2005) reported about five internet-based so called happiness exercises. For example, in one task the participants were asked to write down three positive things each day and the reason why these happened. In another task they had to identify their five highest, signature strengths, and use them during the next week. These exercises proved to make participants happier and less depressed up to six month later too.

The second possible pathway between optimism and health outcomes is behavior, and especially coping behavior. According to the transactional theory of coping, individuals use two kind of cognitive appraisal when they face a stressful situation. In primary appraisal we can decide whether the situation may affect our integrity, or goals. Accordingly the stress of primary appraisal can be harm, threat, or challenge. Secondary appraisal shows how much we can control this harm/threat/challenge, and how we might cope with the situation (Lazarus & Folkman, 1987). It seems that optimism may affect the secondary appraisal and so the selection of coping strategy (Chang, 1998). In general it can be argued that optimism links to particular coping strategies. A growing body of literature showed that higher level of optimism was related to active coping behaviors such as problem-focused coping (Carver, Scheier, & Weintraub, 1989; Iwanaga, Yokoyama, & Seiwa, 2004; Scheier, Weintraub, & Carver, 1986), approach type and confrontational coping (Nes & Segerstrom, 2003), task-oriented coping, and social support as a coping (Hatchett & Park, 2004). Whereas lower level of optimism was associated with emotion-focused coping (Scheier, Weintraub, Carver, 1986), and avoidance as a coping (Nes & Segerstrom, 2003). In addition, optimism was negatively correlated with avoidance strategies (Carver, Scheier, & Weintraub, 1989; Hatchett & Park, 2004; Nes & Segerstrom, 2003). However, more optimistic people do not always use less emotion-focused coping than less optimistic people (Nes & Segerstrom, 2003). Some studies demonstrated in everyday practice that higher optimism with particular coping strategies led to better psychological adjustment, and health outcomes. For example, more favorable immune response (greater lymphocyte proliferation) was related to more optimism, greater use of social support seeking behavior, and positive reframing coping, and less use of disengagement from problems among breast cancer patients (Antoni, 2002). Among HIV-infected men and women with

loss of loved ones suffered from AIDS active coping strategies were predictive of optimism and hope (Rogers, Hansen, Levy, Tate & Sikkema, 2005). In men underwent coronary artery by-pass surgery optimism correlated positively with different forms of problem-focused coping, faster rate of recovery, and faster rate of return to normal life activities, and negatively with denial (Scheier, Matthews, Owens, Magovern, Lefebvre, Abbott, & Carver, 1989). Stability of optimistic beliefs such as positive outcomes and efficacy expectancies depended on the more frequent use of task-oriented coping in people suffered from chronic disease (type 1 diabetes, rheumatoid arthritis, and multiple sclerosis). And in turn, these optimistic beliefs contributed to better reported mental health via using more task-oriented and less emotion-oriented coping (Fournier, de Ridder, & Bensing, 2002).

These findings are not surprising. Since optimism consists of positive expectancies about the outcomes of a situation, it is more likely to increase effort to overcome problems and challenges, and realize goals and mobilize rather active (and sometimes emotion-focused) than avoidance coping strategies. Although active and problem-focused coping strategies in general have been labeled as adaptive resolutions, under uncontrollable situations they might be proved as maladaptive techniques. Under such circumstances emotion-focused strategies might be more adaptive (Conway & Terry, 1992).

Besides coping strategies, health behaviors can also mediate the positive effects between optimism and health. We must note here, however, that there are relatively fewer studies in this field thus far. Most of the time health behaviors can be considered as special types of adaptive (e.g., sports) or inadapative (e.g., substance use) coping. Generally it can be argued that optimism is more likely to be positively associated with health-enhancing behaviors, which may protect and maintain health status, and negatively with health-risk behaviors which endanger and damage health. A study with elderly men, optimism was related to more physical activity, more intake of healthy food (such as fruit, vegetables, wholegrain bread), and nonsmoking (but more alcohol consumption as well) (Giltay, Geleijnseb, Zitmana, Buijsseb, & Kromhoutb, 2007). Another study revealed that people reported engagement in frequent physical activity were more optimistic than those who were less active (Kavussanu & McAuley, 1995). Similar findings indicated in a sample of young Finnish that higher optimism was associated with higher intake of healthy food (e.g., salads, berries, fruits, low fat cheese, etc.) as compared to pessimism, and greater rate of non-smokers was present among optimists than pessimists. In addition, lower level of optimism was related to unhealthy habits, such as heavy alcohol drinking and smoking (Kelloniemi & Laitinen,

2005). In line with these results, optimistic multiple sclerosis and type 1 diabetes mellitus patients tended to engage in more health-promoting behaviors (de Ridder, Fournier, & Bensing, 2004). In another study, optimistic pregnant women practiced more health behaviors during their pregnancy (Cannella, 2006).

As compared to adults, there are even fewer studies among adolescents. Among the few studies, however, some studies in adolescents also show consistent results: Optimism is positively correlated with health-enhancing practices such as exercise, less substance use, nutrition, relaxation, safety, and general health promotion (see, for example, Ayres, 2008; Yarcheski, Mahon, & Yarcheski, 2004). These findings include important practical implications for health promotion. Considering the aforementioned data, the frequency of health behaviors and health-promoting coping may be increasing by strengthening optimism. Mann (2001) tested this assumption. HIV-infected women were asked to write about a positive future that was supposed to alter the level of participants' optimism. Patients with lower optimism showed an increased optimism after the intervention and this resulted self-reported adherence to medications (for example, following the physicians' instructions) and a decreased distress from medication side effects. It is worth to note that patients with higher optimism showed a decrease in their level of optimism after the intervention.

Thus, the health-protective and promoting nature of optimism is well-documented, therefore, it is important to know more about its context and background variables that may contribute to strengthening it. Unfortunately, we know little about the social background variables (such as social support or SES) which may predict optimism. Social support may particularly be important in this regard. Some studies of adolescents documented that optimism was a partial mediator of the positive relationship between social support and positive health practice. These findings generally revealed a positive relationship between social support and optimism as well (Ayres, 2008; Mahon, Yarcheski, Yarcheski, & Hanks, 2007). Of the social network, parental social support may be one of the most relevant. Among the findings, one of the most convincing was that mother's child rearing attitude at ages 3-6 and 6-9 years proved to be a strong predictor of dispositional optimism-pessimism at ages after 21. Hostile mothering (that is, the mother's emotional rejection of her child, her feelings that the child is a burden, and her strict disciplinary style) predicted greater dispositional pessimism (Heinonen, Rääkkönen, & Keltikangas-Järvinen, 2005). Another study of 19 970 working-aged Finns revealed consistent findings: good child-parent relationship was

associated with higher level of adult optimism. In addition, increasing number of adverse events in childhood (such as financial problems, or conflicts in families, divorce, alcohol problem of a family member, etc.) were associated with a decreasing optimism. On the other hand, good child-parent relationship proved to buffer the optimism-reducing effects of these adversities (Korkeila, Kivelä, Suominen, Vahtera, Kivimäki, Sundell, Helenius, & Koskenvuo, 2004).

Relatively few studies focused on the relationship between socioeconomic status (SES) as another important social variable and optimism. Some studies revealed that when pessimism and optimism subscales of the Life Orientation Test were analyzed separately, SES was associated only with pessimism but not with optimism. More precisely, lower SES was related to higher pessimism. It was concluded that SES might contribute to the development of negative expectancies of future outcomes (Robb, Simon, & Wardle, 2009; Taylor & Seeman, 1999). In another study of adults, childhood SES was found to be a predictor of overall Life Orientation Test (LOT) scores and pessimism component scores of LOT. In addition, there was a link between adulthood SES and overall scores, pessimism component scores, and optimism scores (Heinonen, Räikkönen, Matthews, Scheier, Raitakari, Pulkki, & Keltikangas-Järvinen, 2006).

Based on these findings, we conclude that there is a need of further research into mapping adolescent optimism and its role in health behaviors. Therefore, we analyzed social background of adolescent optimism, that is, a set of variables from two major contexts of socialization, namely, family and school. We supposed that some of them might be predictors of adolescents' optimism, such as parental social support or the family's SES. Second, we supposed that positive psychological adjustments (satisfaction with life, self-perceived health as indicators) might be positively associated, while negative psychological adjustments (depression as an indicator) might be negatively associated with adolescents' optimism. And finally, we assumed that optimism might be positively related to health-enhancing behaviors (healthy diet, physical activity), and negatively to health-risk behaviors (alcohol consumption, smoking).

## METHODS

### Participants and Procedures

Data were collected in 2008 among 881 high school students (aged between 14-20 years of age) from five high schools in Szeged, Hungary (grades 1-5). The five schools were chosen randomly from a list of all high schools in Szeged; the high school classes were chosen randomly from a sample of all classes in the population of high schools. Of the sampled students, 44.6 percent were female and the median age of the sample was 16 years of age (Mean = 16.6 years; S.D. = 1.3 years). Of the 900 questionnaires sent out (approximately 13% of the entire high school population in Szeged), 881 were returned. This final sample count gave us a response rate of approximately 97.9 percent. The remaining students likely consisted of youth absent or those youth whose parents did not want them participating in the study. Parents were informed about the study and their consent was obtained prior to the data collection. A standardized procedure of administration was followed. Trained graduate students distributed the questionnaires to students in each class, after briefly explaining the study objectives and giving the necessary instructions, students completed the questionnaires during the class period. Student participation was voluntary and confidentiality was emphasized, noting that the data were being collected for research purposes only.

### Measures

Dispositional optimism was measured using the Hungarian version of the LOT (Life Orientation Test) (Scheier & Carver, 1985). The LOT consists of eight items (plus four filler items that were not scored as part of the scale) assessing generalized expectancies for positive versus negative outcomes. Students were asked to indicate their degree of agreement with each statement. A five-point response scale was used ranging from 0 = strongly disagree to 4 = strongly agree (except for four reverse-coded items). This scale was reliable with a Cronbach's alpha of 0.70.

Self-perceived health as a global health indicator was measured by asking respondents how they compared their own health status to that of their peers

(Piko, 2000; Tremblay, Dahinten, & Kohen, 2003). The responses included: poor = 1; fair = 2; good = 3; and excellent = 4.

As types of health risk behaviors, smoking and (binge) drinking were assessed with the question: “Did you smoke/drink alcohol in the past three months?” Drinking was assessed based on binge drinking (e.g., more than five or more drinks at one time). Response categories in terms of smoking varied from 1 = none to 6 = >20 per a day. Binge drinking was assessed by a 6-point scale from 1 = none to 6 = > 10 times (Kann, 2001). Among health-enhancing behaviors, diet control and physical activity behavior were assessed (Luszczynska, Gibbons, Piko, & Teközel, 2004). Diet control was measured by asking students how much during the past three months they tried to maintain a healthy diet. The response categories varied from never (1) to always (5). Regarding physical activity, the following question was asked: “How many times during the past three months did you engage in physical activity besides school for at least a half hour?” Response categories were never (1), once or twice (2), two or three times a month (3), once or twice a week (4), and three or more times a week (5). For logistic regression analyses, dichotomized values have been applied.

Depressive symptomatology was measured by a shortened version of the original 27-item Children’s Depression Inventory (CDI) that is a self-rated depressive symptom scale for young children adapted from the Beck Depression Inventory for adults (Kovacs, 1992). Each item of the original and shortened versions assesses a single symptom, such as sadness, and was coded from 0 to 2. The shortened version of the CDI, based on the current data, was reliable with a Cronbach’s alpha of 0.74. We weighted the shortened CDI by a factor of 3.375 (number of original CDI items 27/shortened version items 8 = 3.375) for purposes of comparing this sample with other Hungarian, European and US samples of adolescents. Thus, the mean score and standard deviation for this sample was 8.1 (S.D. = 8.0).

Life satisfaction was measured using a Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). The scale consisted of five statements and students indicated how strongly they agreed with each item and those responses ranged from 1 = strongly disagree to 7 = strongly agree. The final scale had a range of 5-35 and was reliable with a Cronbach’s alpha of 0.83.

Among the parental variables, SES variables were the following: SES self-assessment, and parents’ schooling. A four-level classification of education was used to measure father’s and mother’s schooling: 1) primary education; 2) apprenticeship; 3) General Certificate of Education, i.e. high

school level; and 4) University or college degree. In addition, a subjective evaluation of socioeconomic status (SES) was used: "How would you rate your family's socioeconomic status?" The answer categories included: 1) lower; 2) lower-middle; 3) middle; 4) upper-middle; and 5) upper class (Piko & Fitzpatrick, 2007).

Parental social support was measured by the Measures of Perceived Social Support developed by Turner and Marino (1994). Each of the subscales contained six items and was scored so that higher scores indicated greater satisfaction with the perceived support. Satisfaction was measured by the amount of agreement youth had with each of the items. Responses were based on the following categories: 4 = very much like my experience, 3 = much like my experience, 2 = somewhat like my experience and 1 = not at all like my experience. The final perceived social support scales were coded from 6-24 and reliable with Cronbach's alpha coefficients of 0.92 (father support) and 0.91 (mother support). In addition, two other parental variables were also applied (Fitzpatrick, 1997). First we asked the students, how often they talked to their parents about personal problems. This measure was an ordinal level variable where 1 = never talk with my parents... 5 = always. We also asked them how often they ate dinner together with their family (response categories varied from 1 = never to 5 = all of the time).

Among school-related factors, three variables were applied. We asked the students how happy they were with school and those responses ranged from 1 = very unhappy to 4 = very happy (Fitzpatrick, 1997; Piko & Fitzpatrick, 2002). The good academic achievement variable was a self-report measure indicating "grades students mostly get in school" ranging from 1 = mostly D's and F's to 7 = mostly A's. Another variable assessed how often the students talked with teachers about their personal problems with responses varied from 1 = never to 5 = all of the time (Fitzpatrick, 1997; Piko & Fitzpatrick, 2007).

## **Statistical Analyses**

SPSS for MS Windows Release 15.0 was used in the calculations, with maximum significance level set to .05. The analysis begins with a descriptive statistics for the variables in this sample of Hungarian youth. Social background of adolescent optimism was investigated by multiple regression analyses where different models (blocks of variables) were applied to test their relative effect. Bivariate relationships between optimism and other variables were detected using two types of analysis. First, correlation coefficients were

calculated to the relationship between optimism and variables of well-being, namely, depression and life satisfaction. Then, using logistic regression analysis, ORs were calculated for detecting the role of optimism in health behaviors, self-perceived health and other variables of adolescent health and well-being (using their dichotomized forms).

## RESULTS

### Descriptive Statistics

Table 1 presents the descriptive statistics for socioeconomic, parental and school-related variables of Hungarian adolescents in the sample. Most parents reported apprenticeship as a most common type of schooling. Most of the students considered themselves middle class (63.9%), 2.9 percent reported being lower class, and only 1.7% of them said they belonged to the upper (elite) class. The variable “having dinner together with the family” showed a great variance, and only 12.7% of the students reported having dinner together as a family all the time. Talking about personal problems with the family was more common (15.5% of the students reported all of the time) as compared to talking with teachers (only 1.9%). Majority of them were happy with school (65.8%).

Table 2 reports descriptive statistics for the dichotomized health behavior variables. Among the students, 38.5% were current smokers, 68.6% tried binge drinking minimum once during the past 3 months, 65.9% engaged in regular physical activity (that is, minimum once a week), 78.6% of them reported trying diet control (most or all of the time) and 66.9% perceived their own health as good or excellent.

Table 3 shows descriptive statistics for academic achievement, social support and well-being variables. Students reported higher level of social support from mothers (Mean = 19.8) as compared to fathers (Mean = 16.7). The scores on CDI were relatively low and the scores of life satisfaction and optimism were relatively high.

**Table 1. Descriptive statistics for socioeconomic, parental and school-related variables in the sample of Hungarian youth (N = 881)**

Variable and values	Percent
<i>Father schooling</i>	
Primary school	6.2
Apprenticeship	48.2
High school	28.4
College/University	17.2
<i>Mother schooling</i>	
Primary school	9.1
Apprenticeship	38.6
High school	30.5
College/University	21.8
<i>SES self-assessment</i>	
Lower class	2.9
Lower-middle	15.1
Middle-class	63.9
Upper-middle class	16.4
Upper class	1.7
<i>Dinner with family</i>	
Never	8.7
Few times	20.3
Some of the time	29.9
Most of the time	28.3
All of the time	12.7
<i>Talking about problems with parents</i>	
Never	6.6
Hardly ever	19.4
Sometimes	30.1
Most of the time	28.4
All of the time	15.5
<i>Talking about problems with teachers</i>	
Never	43.8
Hardly ever	32.1
Sometimes	17.5
Most of the time	4.6
All of the time	1.9
<i>Happy with school</i>	
Very unhappy	5.8
Unhappy	16.3
Happy	65.8
Very happy	12.1

**Table 2. Descriptive statistics for dichotomized health behavior variables in the sample of Hungarian youth (N = 881)**

Variable and values	Percent
<i>Smoking (ever)</i>	
Yes	38.5
No	61.5
<i>Binge drinking (once or more)</i>	
Yes	68.6
No	31.4
<i>Physical activity (minimum once/week)</i>	
Yes	65.9
No	34.1
<i>Diet control (most or all of the time)</i>	
Yes	78.6
No	21.4
<i>Self perceived health</i>	
Good/excellent	66.9
Poor/fair	33.1

**Table 3. Descriptive statistics for academic achievement, social support and well-being variables in the sample of Hungarian youth (N = 881)**

Variables	Mean (Standard deviation)	Minimum	Maximum
Academic achievement	3.56 (1.46)	1	7
Social support from father	16.71 (5.28)	6	24
Social support from mother	19.83 (4.25)	6	24
Depression (CDI)	8.11 (8.04)	0	47
Optimism (LOT)	28.11 (5.50)	9	40
Life satisfaction (SWL)	21.79 (6.37)	5	35

### **Regression Estimates for Optimism: The Role of Parental and School-Related Variables**

Table 4 presents results for multiple regression analysis for optimism. Among parental variables, talking about problems with parents and parental social support were significant correlates of optimism. This block of variables explained 14% of the total variance. Among school-related variables, talking

about problems with teachers and academic achievement were nonsignificant, however, being happy with school was a predictor. The change in significance was still positive ( $p < .05$ ). Finally, gender and age as controlling sociodemographics were nonsignificant ( $p > .05$ ).

## Relationships between Optimism and Health and Well-Being

Table 5 shows correlation coefficients for bivariate relationships between optimism, depression and life satisfaction. Both depression (negatively) and life satisfaction (positively) were significantly and strongly correlated with optimism.

**Table 4. Multiple regression analysis for optimism**

	<i>Beta</i> <sup>a</sup>
<i>Parent-related variables</i>	
Father schooling	0.14***
Mother schooling	0.05
SES self-assessment	0.04
Dinner with family	0.05
Talking about problems with parents	0.19***
Social support from father	0.09*
Social support from mother	0.09*
$\Delta R^2$	0.14***
<i>School-related variables</i>	
Good academic achievement	0.03
Talking about problems with teachers	0.01
Happy with school	0.11**
$\Delta R^2$	0.012*
<i>Sociodemographics</i>	
Age	0.01
Gender	-0.06
$\Delta R^2$	0.003
Total $R^2$	0.15***

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ ; one-tailed t-test

Note: <sup>a</sup>regression coefficients

**Table 5. Correlation matrix for bivariate relationships between optimism, depression and life satisfaction**

	1.	2.	3.
1. Optimism (LOT)	-		
2. Depression (CDI)	-0.458*	-	
3. Satisfaction with life (SWL)	0.428*	-0.480*	-

\*p<.01

**Table 6. Estimated Odds Ratios (OR) of the effects of optimism (as independent variable) on each health and well-being variable (as dependent variables) using binary logistic regression analysis**

Dependent variables	Optimism as independent variable OR <sup>a</sup> 95% CI <sup>b</sup>
Binge drinking	0.971 (0.945-0.998)*
Smoking	0.991 (0.966-1.017)
Physical activity	1.045 (1.017-1.073)**
Diet control	1.070 (1.039-1.102)**
Depression (CDI) <i>Score</i> $\geq 20^+$	0.851 (0.799-0.905)**
Satisfaction with life <i>Score</i> $\geq 30^+$	1.351 (1,239-1,472)**
Self-perceived health <i>Good/excellent</i>	1.179 (1,128-1,233)**

<sup>a</sup>OR, odds ratios <sup>b</sup>95% CI, 95% confidence intervals

\*p<.05

\*\*p<.001 (p values)

<sup>+</sup>The cut-off score was based on the upper 10% of the distribution

Table 6 presents estimated Odds Ratios (OR) of the effects of optimism on each health and well-being variable. Among health behaviors, optimism predicted binge drinking (OR = 0.971, p < .05), physical activity (OR = 1.045, p < .01) and diet control (1.070, p < .001), and only smoking was a nonsignificant dependent variable. For depression (OR = 0.851, p < .001), life satisfaction (OR = 1.351, p < .001) and self-perceived health (OR = 1.179, p < .001), optimism was an important predictor.

## DISCUSSION

Optimism is a significant health protective factor (Allison, Guichard, Fun & Gilain, 2003; Segerstrom, 2005; Taylor, Kemeny, Reed & Bower, 2000), and positive psychology unambiguously defines it as a positive human strength (Seligman, Steen, Park & Peterson, 2005). Nevertheless considerably few information is available about factors which might maintain optimism. Thus, in this study first we investigated the parental and school-related factors which might predict the personal level of this construct. Parental variables predicted 14% of the level of optimism and talking about problems with parents, social support from father, social support from mother, and father schooling were significantly related to optimism. Significant relationship between the first three variables and optimism is in line with previous investigations. As it has been mentioned in the introduction, parent-child relationship usually predicts the personal level of optimism (Korkeila, Kivelä, Suominen, Vahtera, Kivimäki, Sundell, Helenius, & Koskenvuo, 2004). Furthermore many other studies indicated that although social network changes in adolescence due to the growing role of peer relationships, parent-adolescent relationship still has an impact on adolescent's mental well-being (Hair, Moore, Garrett, Ling, Cleveland, 2008; Joronen, Asted-Kurki, 2005). This is consistent with our present data. Most of the time father is the main breadwinner in the family. Material well-being and existence might also predict optimism, this can explain that father schooling was significantly related to optimism.

Among school-related variables, only being happy with school proved to be significant predictor of optimism. Besides family and friends, school is an important domain of socialization for adolescents. Not surprisingly, previous studies also found that satisfaction with school (Karademas, Peppas, Fotiou, & Kokkevi, 2008; Van Ryzin, Gravely, & Roseth, 2009) and good academic achievement (Creed, Mueller, & Patton, 2003) played an important role in adolescents' well-being and psychosocial adjustments. Unlike previous studies (see e.g., Karademas, Peppas, Fotiou, & Kokkevi, 2008), however, social support from teachers did not act as a predictor of optimism in this sample.

Another goal of this study was to provide further data about the relationship of optimism and different measures of psychological adjustment. Some previous findings have already confirmed the positive relationship between optimism and health behaviors (see for example, Ayres, 2008; Yarcheski, Mahon, & Yarcheski, 2004). Our results were consistent with them: optimism was a significant predictor of physical activity, diet control,

and less bring drinking but not of smoking. Depression obviously proved to be a protective factor against depression, it significantly predicted satisfaction with life, and optimists evaluated their own health better. These confirm some previous results (see for example Extremera, Duan, & Rey, 2007; Chang, Sanna, & Yang, 2003).

In summary, our survey justified that 1) some social factors (father schooling, parental social support, and talking about problems with parents) predicted significantly (although in a little extent) levels of adolescent optimism; 2) optimism was related to beneficial health behaviors; 3) optimists had better psychological adjustments (they were less likely to report depression, evaluated better their own health, satisfied more with their life). Nevertheless, longitudinal studies are needed in order to reveal the cause-and-effect relationships between optimism, social influences and different health indicators. However, it is obvious that optimism is an important protective factor regarding adolescents' health-related behaviors and psychosocial well-being.

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*Chapter 6*

**IS LEGAL RESPONSIBILITY MORE  
IMPORTANT THAN SIMPLE PRIOR  
ACCIDENT IN REDUCING UNREALISTIC  
OPTIMISM IN THE AREA OF DRIVING?**

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**ABSTRACT**

Some studies have shown that unrealistic optimism, the tendency to believe that one's risk is less than that of one's peers, is reduced when people have personal experience with an event. Nevertheless, in the area of driving, this impact of prior experience appears to be unsystematic. This inconsistency could be due to a dimension that was not taken into account, namely the legal personal responsibility involved. Someone who has been the victim of an accident for which he was not declared legally responsible may continue to be unrealistically optimistic contrary to someone declared legally responsible. To examine this hypothesis, we compared drivers that have had no accident with drivers that had been involved in minor car accident for which they were, or were not, legally responsible. All participants were asked to evaluate the likelihood of

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being confronted with two risks (accident involving car damages and accident involving physical injury), in comparison to the average driver. Results from this study suggest that in the area of driving, legal responsibility is a stronger determinant of unrealistic optimism reduction than simple prior experience of an accident and that this impact is risk specific.

## INTRODUCTION

In the area of driving, as in a range of other domains, people often consider that they are less likely than others to experience negative events and more likely than others to experience positive events (Bränström, Kristjansson, & Ullén, 2006; Causse, Kouabenan & Delhomme, 2004; Weinstein, Lyon, Rothman & Cuite, 2000). A person's assertion that they are less likely to undergo misfortune than someone else may be entirely valid. But if most people in a group see their chance of experiencing a negative event as below average, some of them must be wrong. It is logically and statistically impossible for most people to be better off than the average. Thus, this phenomenon is known as unrealistic optimism, optimistic bias (Weinstein, 1980) or comparative optimism (Harris & Middleton, 1994). The problem is that this systematic bias could lead to non-optimal decisions and behaviours because people perceive themselves as being relatively invulnerable to threat; this could affect risk-reduction motivation and activities (Weinstein, 1984). For example, drivers who perceive themselves as less likely to be charged with penalties than other drivers, commit more traffic violations (Dionne, Desjardins, Ingabire & Aqdim, 2001). On the other hand, reducing the optimistic bias in self-perception could encourage preventive behaviour (Raghubir & Menon, 1998), but this bias has proven extremely resistant to experimental manipulations (Weinstein & Klein, 1995).

However, some studies support the notion that personal experience moderates the optimistic bias (Burger & Palmer, 1992; Helweg-Larsen & Shepperd, 2001). Individuals who have never been confronted with an event tend to believe that they are not predisposed to face it and feel more optimistic compared to others. On the other hand, a prior experience with a given negative event leads people to be less optimistic (Helweg-Larsen, 1999; Van der Velde, Hooykaas & Van der Pligt, 1992; Weinstein, 1980). A number of factors could account for the role of experience. It has been argued, for example, that experiencing a negative event may decrease the perception of

personal control (Helweg-Larsen & Shepperd, 2001). People could perceive that they had no more control over events than others and thus could be equally likely to experience unwanted outcomes. In addition, a prior experience may lead to the availability of an event (Chambers, Windschitl & Suls, 2003). People would be more able to imagine a negative event and therefore would judge it more likely to occur (Stapel & Velthuisen, 1996). The influence of prior experience could also lead to negative affects that would involve a more systematic analysis of the situation (Helweg-Larsen, 1999). People would be more able to consider their negative characteristics (exceeding the speed limit, driving after drinking alcohol, etc.) and/or other people's positive characteristics (respecting the speed limit, not driving after drinking alcohol, etc.).

Whatever the explanation, in the area of driving, the role of prior experience remains unclear. According to some research, people who have been victims of a car accident showed less unrealistic optimism (Matthews & Moran, 1986; Pavic, 2006). In some others, there was no evidence that prior accident reduced the optimistic bias (Holland, 1993; McKenna & Albery, 2001; Rutter, Quine & Albery, 1998; Svenson, Fischhoff & MacGregor, 1985). Finally, other research found a positive correlation between comparative optimism and prior accidents. Those who had the largest experience of accident were the ones who were the most unrealistically optimistic (Causse, Kouabenan & Delhomme, 2004; Delhomme & Cauzard, 2000).

The inconsistency of these results could be due to a dimension that was not taken into account but could have an influence in the area of driving, namely the legal personal responsibility involved. The majority of drivers consider other drivers as the cause of accidents (Delhomme, 1991) whereas car accidents can have manifold causes (Montag & Comrey, 1987). Someone who has been the victim of an accident for which he was not declared legally responsible may continue to be unrealistically optimistic because this prior experience confirms the responsibility of the other driver. On the other hand, when the victim is declared legally responsible, his prior experience could lead to a change in the perception of his own risk compared to others and in a decrease of the optimistic bias.

Another important factor is the general or selective effect of prior accident and legal responsibility involved. Will a prior accident with legal responsibility generate a general comparative optimism variation or will it only have a restricted impact on comparative optimism related to very similar events? Some research that compared the impact of prior experience on different types

of events (health, driving, etc.) led to the conclusion that prior experience had a limited impact (Mc Kenna & Albery, 2001). For example, students who have been confronted with an earthquake no longer show optimistic bias for natural disasters but still do so for other events (Burger & Palmer, 1992).

But in most research concerned with driving, whatever their prior experience was, people were asked to evaluate their car accident likelihood in general without, for instance, taking into account the consequences of the accident. People may not perceive the probability of an accident leading to minor car damages as equivalent to the probability of experiencing an accident leading to physical injury. It may be possible that a prior accident decreases comparative optimism about the same kind of accident but not about another kind; it would not change the general perception of personal risks compared to others but only the unrealistic optimism directly related to the experienced negative event. Therefore, if people had been confronted with a minor accident (car damages) for which they were legally responsible, they may reconsider their optimism for the very similar event but not for an event that implies other more serious consequences (physical injury).

The last feature of the present investigation concerns drivers aged over 65 years. This older section of the population, which will continue to increase (Langford, Fitzharris, Newstead &, 2004), has potentially contradictory characteristics. Normal aging is associated with physical, sensory, and cognitive changes that can diminish the objective abilities of elderly drivers. For example, with age the peripheral field of vision becomes narrower (Rogé, Pebayle, Lambilliotte, Spitzenstetter & Muzet, 2004). Moreover, because of their physical fragility, older drivers who are involved in motor vehicle crashes are more likely to be injured than younger drivers (Li, Braver & Chen, 2003). On the other hand, elderly drivers have generally accumulated an important driving experience that can lead to over-confidence in their driving capabilities (Groeger & Brown, 1989) and consequently to unrealistic optimism when they compare their accident risk to that of other drivers (Spitzenstetter & Moessinger, 2008). Because of their broad experience, we can suppose that older drivers with a prior accident for which they were not declared legally responsible would still be unrealistically optimistic, whereas drivers declared legally responsible for prior accident would show less unrealistic optimism.

## 2. METHOD

### 2.1. Participants

A total of 66 French drivers (39 men and 27 women) aged 65 to 76 years ( $m=70$ ) took part in this research. All of them had held a French driving licence for an average of 40 years and drove on average less than 200 kilometers per week.

### 2.2. Procedure

Legal responsibility in previous experience was operationalized in terms of whether participants had been involved (or not) in a car accident for which they were legally responsible (or not). They were recruited from within a list of volunteers who had initially completed a questionnaire presented as a study on driving habits. The criteria for inclusion were that the person was at least 65 years old, held a French driving licence and had not been involved in a car accident during the last 12 months, or had been involved in a minor car accident (involving personal car damages or personal and other driver car damages) during that period for which the person was (or was not) legally responsible. Among the respondents, 21 had a car accident for which they were legally responsible (accident took place 4 to 9 months prior to the study, 19 had a car accident for which they were not legally responsible (accident took place 3 to 10 months prior to the study) and 26 had no accident at all. These characteristics constitute a between-participants factor with 3 modalities (accident with legal responsibility, accident without legal responsibility, no accident). This questionnaire also enabled us to be sure of the equivalence of the three groups in terms of driving habits and driving situations.

In order to measure unrealistic optimism, we used the direct method (Weinstein 1980) in which participants are asked a single question requiring them to compare their own risk to that of the average other. More precisely, in this study, participants were asked to compare their likelihood of experiencing two events in comparison with the average driver, same age, same sex, on a 7 points scale, with the lower end of the scale (-3) indicating « extremely less chance for me » and the upper end (+3) indicating « extremely more chance for me » such that a score of 0 indicates no optimistic bias, a score below 0 indicates optimism, and a score greater than 0 indicates pessimism. One event

(to damage your car in a crash) corresponds to the experience some of the participants had had, whereas the second one (to be severely injured in a car crash) does not correspond to the experience participants had had. The order of the two events to be judged was randomized.

### 3. RESULTS

Comparative optimism has been analyzed (ANOVA) as a function of a 3 (Prior responsibility: accident with legal responsibility, accident without legal responsibility, no accident) x 2 (Items: body damages, car damages) factorial design with the first factor manipulated between participants and the second factor varying within them.

As expected, the ANOVA revealed an interaction between events and prior responsibility,  $F(2, 63) = 4.31, p < .02$ . Newman-Keuls post hoc analyses showed that there is an impact of prior responsibility but only when the likelihood of car damages was evaluated, that is the event similar to their prior experience. In this condition, the “with legal responsibility” group ( $M = 0.59, SD = 0.19$ ) was significantly different from the “without legal responsibility” group ( $M = -0.55, SD = 0.32$ ) and the “without accident” group ( $M = -0.39, SD = 0.26$ ). When “with legal responsibility” drivers compare themselves to the average driver, they exhibit comparative pessimism evaluation. The  $t$  test showed that the mean in this group was significantly higher than 0 at  $p < .001$ . They consider that their personal chance of being confronted with another accident with car damages is higher. Whereas the “without legal responsibility” group did not have a different level of comparative optimism compared with those without an accident. Those participants considered that their risk was below the average driver of the same sex and age. The  $t$  test revealed that the two means were significantly inferior to 0 at  $p < .001$ .

On the other hand, when the likelihood of body damages was evaluated there was no effect of prior responsibility. Accident responsible drivers ( $M = -0.48, SD = 0.22$ ) were as optimistic as the accident non-responsible drivers ( $M = -0.47, SD = 0.15$ ) and the no accident drivers ( $M = -0.42, SD = 0.14$ ). All the groups were unrealistically optimistic. Again, the  $t$  test showed that in the three conditions the means were significantly inferior to 0 at  $p < .001$ .

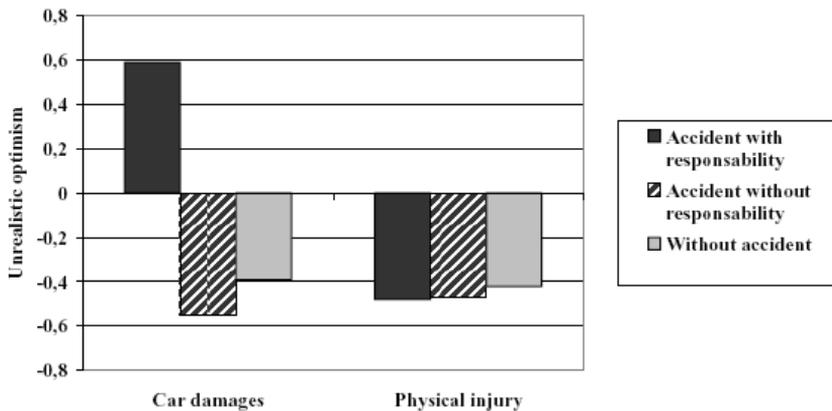


Figure 1. Unrealistic optimism about car damages and physical injury in function of responsibility in prior accident

#### 4. CONCLUSION

The aim of this study was to explore the impact of legal responsibility involved in a prior experience of a car accident on unrealistic optimism and this in the older age-group of drivers. The present results, first suggest that the question of legal responsibility involved in a prior accident can be relevant and could be a factor in the optimistic bias reduction in the field of motoring, and secondly show the robustness of this bias. Indeed, as expected, our results support previous work indicating that, relative to the average driver of similar age, people think that they are less at risk (Spitzenstetter & Moessinger, 2008; Holland, 1993). In most cases, our participants seem to underestimate the risk of being confronted with negative events related to driving when they compare themselves to others.

More importantly, and also as expected, we found an impact of the prior experience only when personal legal responsibility was involved and only when participants evaluated their likelihood to be confronted with the same event that they had experienced. The respondents who were responsible for their accident showed pessimism when they had to evaluate the risk of damaging their car in the future, whereas, respondents who were not responsible for their accident were as optimistic as non-accident drivers. Thus, our finding is in line with previous reviews that showed no direct incidence of prior experience on unrealistic optimism (Rutter, Quine & Albery, 1998;

Welkenhuysen, Evers-Kiebooms, Decruyenaere, & van den Berghe, 1996). There is no general effect of the experience of an accident on the comparative evaluation of risk. Thus, it appears that unrealistic optimism in driving is not affected by the experience of a prior accident itself, but more by the personal legal responsibility involved in this prior experience. This may be due to the fact that when a driver causes an accident, his personal competence is directly called into question, whereas when a driver is “just” a victim he can still believe in his ability and think that his risk is lower.

Our results also suggest that the impact of prior responsibility is limited and largely dependent on the specific characteristics of the experience. When participants evaluated their likelihood to be confronted with an event that they have not previously been confronted with (in our case physical injury) they are still all unrealistically optimistic. Thus, just as McKenna and Albery (2001) found no generalization of the effect of prior experience across domains (Driving/Health), we found no generalization of prior responsibility across items (Physical injury/Car damages). Having caused an accident that led to car damages does not have an influence on the evaluation of the likelihood of physical injury. This particular prior experience in which personal legal responsibility was involved did not change the general perception of personal risks compared to others but only the unrealistic optimism directly related to the experienced negative event. According to McKenna and Albery (2001), these results could be related to the fact that the experienced accident was minor and involved no injury. Since the accident had no major consequences, it may lead to no major change in unrealistic optimism. It would be interesting to pursue research in order to find out whether similar results would be obtained if people who had experienced personal bodily damages were asked to evaluate body and car damage likelihood. Further research is required. It will be necessary to determine whether there is a combined effect of the legal responsibility involved and the seriousness of the experienced accident. It is possible that the impact of seriousness depends on the responsibility of the driver in the accident.

The proximity of the accident could also be taken into account. According to Burger and Palmer (1992), the impact of negative experience diminishes over time. As the accident in our study took place at least three months before, its influence may be weakened. It may be necessary to compare drivers whose personal legal responsibility was engaged in a very recent accident to drivers whose personal legal responsibility was engaged in a less recent accident.

Finally, an extension of the sample will be needed in order to enable a comparison with younger drivers. Because driving is very important for them

(Razon, Thevenot, Goldstaub, Sturm, & Kopp, 2003), elderly drivers could be especially motivated to feel less at risk to keep on driving than other drivers, even if they have had an accident. This motivation could explain the limited effect of prior responsibility and the lack of effect of prior experience itself in this study. It would be interesting to test if the same impacts are present in younger drivers.

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*Chapter 7*

**DOES COMPARATIVE OPTIMISM  
RESULT FROM A CONSCIOUS  
STRATEGY OF SELF-PRESENTATION?**

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**ABSTRACT**

Comparative Optimism (CO), the tendency to think that one will experience more positive and fewer negative events than others (Weinstein, 1980), has been largely demonstrated. Within the different theories posited for CO, the fact that it could result from a conscious strategy of self-presentation has only been superficially explored. However, indirect data support this hypothesis. First, when people are explicitly asked to compare themselves to others, they often express more CO than when they have to evaluate separately their own risk and their peer's one (Perloff & Fetzner, 1986; Spitzenstetter, 2003). Secondly, studies using the judge-paradigm show that CO is a socially valued phenomenon since a person who displays CO compared to more

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pessimism will be judged more positively by the peers (Helweg-Larsen, Sadeghian & Webb, 2002).

Thus, it was interesting to test if people are self-aware of this socially valued dimension of CO when they are asked to evaluate their own risks. In other words, using the self-presentational paradigm (Jellison & Green, 1981), we tested if CO could result, at least partially, from a self-presentation motivation.

Participants had to complete a questionnaire in which they had to evaluate their risk of being confronted with nine negative events (e.g., car accident) either on a direct or an indirect scale. They were told to complete the questionnaire spontaneously or with the aim to convey a favorable (*vs.* unfavorable) impression of themselves. We postulated that if CO results from a self-presentation motivation, CO would be reinforced by explicit comparison and the spontaneous evaluation would be equivalent to the evaluation elicited by the favorable impression condition.

Results show that a comparable level of CO is present whenever participants have to depict themselves positively or to answer spontaneously. Moreover, in these conditions, the direct method elicits more CO than the indirect one. On the other hand, no CO has been detected when participants have to depict themselves negatively. In this case, participants displayed rather “realism” (same risk as the comparison target) when the direct method is used.

Our results demonstrate that CO can be, at least partially, explained by a presentational motivation. People obviously evince normative perspicacity (Py & Somat, 1991), modulating consciously their CO according to the social environmental constraints.

## 1. INTRODUCTION

A large body of social psychological research has revealed the phenomenon of comparative optimism (CO), that is the tendency of people to report that they are less likely than the average person to experience a negative event and more likely to experience positive events (Harris & Middleton, 1994; Weinstein, 1980). Even if this optimistic bias has been demonstrated for a variety of outcomes, including health problems (Weinstein, Marcus & Moser, 2005), work accidents (Spitzenstetter, 2006) or unwanted pregnancy (Aucote & Gold, 2005), little is known about the underlying mechanisms of this phenomenon.

Within the different explanations posited for CO, the fact that this bias could result, at least partially, from the motivational dimension of self-

presentation has been considered. Self-presentation has been defined as the goal-directed process of people controlling information about the self to influence the impression others form of them (Schlenker, Britt, & Pennington, 1996). Thus, people may not particularly believe in a rosy future for themselves but just pretend so to project a favorable identity-image to others (Tyler & Rosier, 2009).

Indirect data support the self-presentation hypothesis. Studies using the judge-paradigm showed that CO is a socially valued phenomenon. Indeed, a person who delivers comparative optimistic estimates is judged more positively by peers than a person displaying more pessimism (Helweg-Larsen, Sadeghian & Webb, 2002; Le Barbenchon & Milhabet, 2005). Moreover, CO seems to be culturally dependent. Heine and Lehman (1995) showed that Canadians report significantly greater CO compared with Japanese people on all future negative events introduced. Thus, it appears that CO may be greater in societies where self-valorization is expressed in terms of self-individual superiority, a result providing further evidence for an underlying self-presentation explanation. Nevertheless, the fact that CO could result from a conscious strategy of self-presentation has only been superficially experimentally explored and yet leads to inconclusive results. For example, Hoorens and Buunk (1992) by comparing risk estimations given in private and anonymous circumstances with estimations that were believed to be public and identifiable found similar levels of CO. On the contrary, Tyler and Rosier (2009) by telling their participants to structure their estimates to convey either a favorable or an unfavorable impression showed that people associate a favorable identity-image with the conveyance of an optimistic outlook.

If Tyler and Rosier (2009) were able to demonstrate recently a compelling basis for a self-presentation explanation for CO, they only employed the direct measure method (i.e., participants are explicitly asked to make a direct comparison on a single scale between their own probability and the probability for an average other) to assess CO. However, CO can also be assessed by an indirect approach (i.e., participants are asked two questions, requiring them to estimate separately their own risk and that of an average other). Because the two measure methods (direct and indirect) were demonstrated to not necessarily lead to equivalent CO results (Spitzenstetter, 2003; Welkenhuysen, Evers-Kiebooms, Decruyenaere & van den Berghe, 1996), the data of Tyler and Rosier (2009), as they incidentally mentioned it themselves, needed to be confirmed using an experimental design employing the indirect method. Such a study would moreover provide the opportunity to examine whether people's

comparative optimistic estimates reflect or involve a self-presentational adjustment for themselves, for the target, or for both.

Thus the aim of the present study is to compare the impact of the two measure methods on CO occurrence in different self-presentational situations.

## 2. METHOD

### 2.1. Participants

One hundred and sixty four undergraduates (102 females, 62 males) from Strasbourg University participated in this experiment (mean age = 19.4). They were randomly assigned to one of the six experimental conditions. Participation was voluntary, and the study was carried out anonymously.

### 2.2. Procedure

Participants were assigned to one of the three impression conditions. They were asked to answer questions in order to convey a favorable/unfavorable impression or to answer spontaneously. In the questionnaire they had to assess the likelihood that they would be confronted with 9 negative events (e.g., victim of a car accident, Aids...) either on a direct or an indirect scale. The direct comparison was formulated as follows: "Compared to the average student of your age and gender what is the probability that you will be confronted to...". In the indirect condition participants separately assessed their own probability and the probability for the average student. The question was formulated as follows: "What is the probability that you/the average student of your age and gender will be confronted to".

Participants responded to all questions on a 7-point Likert scale. The scales used with self and other-questions were identical, the end-points being labelled "certain not to happen" (1) and "certain to happen" (7), and the mid-point (4) being labelled 'even'. Indirect comparative optimism was calculated by subtracting the other-estimate from the self estimate. For the direct-question, the end-points were labelled 'much lower risk' (-3) and 'much higher risk' (+3), and the mid-point (0) was labelled 'equal'. Thus, with both scales negative scores indicate the presence of comparative optimism.

### 3. RESULTS

Comparative optimism was analyzed as a function of a 2 (measure method: direct vs. indirect) x 3 (impression: favorable vs. unfavorable vs. spontaneous) factorial design with the two factors manipulated between participants and the comparative optimism scores ( $\alpha = .70$ ) as the dependent variable. This analysis revealed a main effect of the measure method,  $F(1, 158) = 5.83, p < .01, \eta^2 = .04$ , CO scores being higher in the direct condition ( $M = -1.19, SD = 1.62$ ) than in the indirect one ( $M = -0.76, SD = 0.86$ ).

A main effect of the impression was also revealed,  $F(2, 158) = 24.88, p < .000001, \eta^2 = .45$ . Newman-Keuls post hoc analyses revealed that in both favorable ( $M = -1.30, SD = 0.88$ ) and spontaneous impression ( $M = -1.22, SD = 1.02$ ) conditions CO scores were equivalent and higher than in the unfavorable impression condition ( $M = -0.19, SD = 1.29$ ), in which participants expressed actual realism.

These results were moderated by an interaction effect,  $F(2, 158) = 7.14, p < .001, \eta^2 = .24$ . Post hoc analysis (Newman-Keuls) showed that when participants had to convey a favorable impression or to answer spontaneously, they showed more CO when the direct method was used as compared to the indirect method. On the contrary, when participants had to convey an unfavorable impression there was no significant difference between the scores obtained with the indirect and the direct methods. However, it is noteworthy that when these scores were analyzed (Student t tests) in terms of presence or absence of CO, it appears that the participants were slightly optimistic with the indirect method whereas with the direct method they were realistic (i.e. score not significantly different from 0, meaning same level of risk for self and average other). See Table 1 for means and standard deviations.

**Table 1. Comparative Optimism as a Function of Impression and Measure Method**

Impression	Direct		Indirect	
	M	SD	M	SD
Favorable	-1.94*a	1.03	-0.92*b	0.49
Unfavorable	0.12c	1.66	-0.35*c	1.05
Spontaneous	-1.68*a	1.33	-1.01*b	0.77

Means sharing the same subscript do not differ significantly ( $p < .05$ )

\* Presence of comparative optimism

**Table 2. Risk Estimate as a Function of Impression and Target**

Impression	Self		Other	
	M	SD	M	SD
Favorable	3.07 <sub>a</sub>	0.89	4.00 <sub>c</sub>	0.84
Unfavorable	3.87 <sub>b</sub>	1.20	4.28 <sub>c</sub>	1.17
Spontaneous	2.87 <sub>a</sub>	0.93	3.84 <sub>bc</sub>	0.85

Means sharing the same subscript do not differ significantly ( $p < .05$ )

Within the indirect method, self- and average other's risks were analyzed as a function of a 2 (evaluation order: self/other vs. other/self) x 3 (impression: favorable vs. unfavorable vs. spontaneous) X 2 (target: self vs. other) factorial design with the two first factors manipulated between participants and the target manipulated within participants. A main effect of impression was observed,  $F(2, 100) = 6.13, p < .003, \eta^2 = .16$ . Post hoc analyses showed that in both the favorable ( $M = 3.54, SD = 0.84$ ) and the spontaneous ( $M = 3.35, SD = 0.89$ ) impression conditions participants indicate significantly lower risk level than in the unfavorable impression condition ( $M = 4.08, SD = 1.11$ ). A main effect of target was also observed,  $F(1, 100) = 94.34, p < .000001, \eta^2 = .64$ , scores for self-risk ( $M = 3.26, SD = 1.07$ ) being lower than scores for average other-risk ( $M = 4.04, SD = 0.95$ ).

However these results were moderated by an interaction effect between impression and target on risks estimates,  $F(2, 100) = 5.00, p < .008, \eta^2 = .11$ . Post hoc analyses revealed that participants changed their estimates in function of impression conditions only for their personal risk and not for other's one. See Table 2 for means and standard deviations.

## CONCLUSION

The aim of the present study was to complete the results of Tyler and Rosier (2009) and to supply further arguments to support the hypothesis of a self-presentational motivation underlying comparative optimism. By integrating an indirect measure method, we confirmed the relationship between self-presentation and CO. Indeed, by contrast to what they do when asked to convey an unfavorable impression, participants asked to project a favorable image of themselves express comparative optimism especially when the direct measure method was used. Nevertheless, contrary to Tyler and

Rosier's results the optimistic estimates were not higher in the favorable impression condition than in the spontaneous one. This difference could be related to the perceived controllability of the negative events introduced (Harris, 1996). Indeed, it has been shown that people display greater optimistic bias for controllable events (Weinstein, 1980) probably because they believe they are more likely than others to take precautions that prevent the occurrence of the event (Helweg-Larsen & Shepperd, 2001). Thus, when asked to convey a favorable image, people might be especially motivated to elicit optimistic bias for controllable events. The negative events introduced in the present study may have been perceived as less controllable than those proposed by Tyler and Rosier (2009). This point deserves to be confirmed and completed by further research. It would be interesting to evaluate the relationship between event controllability and self-presentation.

However, participants in our spontaneous condition also elicit CO. This might demonstrate the presence of normative perspicacity (Pasquier & Valeau, 2006; Py & Somat, 1991), i.e., the knowledge that being viewed as an optimist may represent a socially agreed-upon desired identity-image. Spontaneously, people will tend to project this positive image of themselves.

Another intriguing data concerns the absence of pessimistic estimates observed in our unfavorable impression condition. This finding seems to be in line with Tyler and Rosier's results. Indeed, even if they did not point out this fact, their scores in the unfavorable impression condition appear very close to the scale mid-point. Thus, both studies tend to reveal in this condition a more realistic evaluation of the risk (i.e., the perception of a same level of risk for self and average other) at least when the direct method is used. According to Peeters, Cammaert and Czapinski (1997), this can be due to the fact that optimism and pessimism may not represent the two opposite dimensions of a same continuum. Instead, the opposite dimension of CO is rather realism, the comparative pessimism functioning as a separate unipolar dimension that characterizes people who are less mentally healthy. In this context, participants' responses would appear to be perfectly coherent with the opposite instructions; the conveyance of a favorable image leading to CO, the conveyance of an unfavorable one leading to realism. On the other hand, because pessimistic comparative estimates have also been found (Chappé, Verlhiac & Meyer, 2007; Kruger & Burrus, 2004) among an average student population, comparative pessimism may still be considered as the opposite of comparative optimism. In this context, realism would be considered as the scale mid-point of the optimistic/pessimistic continuum. The presence of realism in our study could then be interpreted by considering that participants,

in the unfavorable condition, tend to find a relative balancing point between their implicit desire to convey a favorable impression and the explicit instruction to convey an unfavorable one (Pasquier & Valeau, 2006).

Concerning the impact of the measure methods, our results complete the study of Tyler and Rosier (2009) by showing that CO variations in the indirect method are only due to a self-presentational adjustment for the self. Indeed, the risk evaluation for the average other did not change as a function of the impression condition or the evaluation order. Thus in our study, other's risk estimates remained stable whereas self-risk estimates varied as a function of the impression condition.

Our results concerning the favorable and spontaneous impression conditions also confirm previous data showing that the direct method elicits more CO than the indirect one (Welkenhuysen, Evers-Kiebooms, Decruyenaere & van den Berghe, 1996). It has been hypothesized that people in the direct method condition do not engage in a comparison process with others but only report their self position (Eiser, Pahl & Prins, 2001). To the contrary, the indirect condition implicates an evaluation of others that respondents cannot set aside and which might temper excessive optimistic estimates. Such a significant difference between the two measure methods is not observed within our unfavorable impression condition. This result deserves to be further investigated. Indeed, our data led to suggest the presence of a slight level of CO with the indirect method instead of the realism observed with the direct one. In this case, one would consider that in the indirect method participants are confronted, as in the direct condition, to the desire to obey the experimenter's instruction (convey an unfavorable impression) but also to a new pressure induced by the obligation to take into account the reference to others: their will to distinguish themselves from others (Hoorens, 1995). According to our data, this double pressure seems to lead participants to heighten their own risk estimates however without reaching the other's risk level. Further conclusive research could then reinforce the hypothesis of a self-focus process induced by the direct measure method and the absence of comparison process with others in this case (Aucote & Gold, 2005).

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*Chapter 8*

# **UNDERSTANDING OPTIMISM AS AN EMOTIONAL RESPONSE TO THE FUTURE**

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## **ABSTRACT**

This commentary reviews recent evidence that optimism is the result of emotional processes. The emotional basis of optimism appears to be part of a motivational system that typically functions quite well and allows people to identify the goals they want to pursue and situations they want to avoid. Sometimes, though, unjustified optimism can lead people to take excessive risks or fail to protect themselves from harm. Therefore, understanding the causes of optimism and identifying ways to reduce optimism when needed has implications for the quality and length of human lives. Recent research provides compelling evidence that optimism results when people have positive or negative affective reactions to a potential future event. Although optimism results from these automatic and emotional processes, analytic resources can be deployed to reduce optimism when people have an intense emotional reaction or when they are encouraged to use emotion regulation strategies. This commentary includes discussions of 1) the relationship between emotional reactions and optimistic judgments and how this relationship is impacted by a number of individual and situational factors, 2) the implications of this process for attempts to reduce optimism to

encourage more realistic judgments, and 3) the implications of this process for health, wealth, and well-being.

## INTRODUCTION

Popular culture has recently stressed the importance of positive thinking for success in everything from obtaining a desirable job to beating cancer (e.g., Berg, 2007; Bjerklie, 2005). There is something inherently comforting about the idea that we can simply think positive outcomes into existence and some studies have shown that optimistic people have better lives. Indeed, optimism has been linked to greater academic and professional success, better health, and a longer life (Peterson & Bossio, 2001; Scheier et al., 1989; Taylor & Brown, 1988). Yet very little is understood about where optimism comes from or why some people are more optimistic about the future than others. Further, little is understood about how to reduce optimism in situations that call for more realistic appraisals in order to encourage behavior change. Sometimes unjustified optimism can lead people to take excessive risks or fail to protect themselves from harm, such as a smoker who refuses to believe that he will develop lung cancer in the future (Colvin & Block, 1994; Perloff, 1983; Tennen & Affleck, 1987). A better understanding of the causes of optimism would allow for the development of interventions to increase or decrease optimistic thinking in different situations. This commentary reviews recent evidence that optimism results from emotional reactions to potential future events and that optimism can be increased or reduced through interventions that target emotional processes. The potential implications of this process for the quality and length of people's lives will also be discussed.

## EVIDENCE OF THE EMOTIONAL BASIS OF OPTIMISM

What is optimism and where does it come from? Optimism is usually defined as holding positive expectations about the future, such that one expects positive events to occur and negative events not to occur. Evidence suggests that most people are, on average, optimistic about their futures (Taylor & Brown, 1988). People judge that they are more likely than others to experience positive events and less likely than others to experience negative events (Lench & Ditto, 2008; Weinstein, 1980). People also generally believe that

their preferred outcomes, such as the victory of a favorite sports team or political candidate, are more likely than non-preferred outcomes (e.g., Babad & Katz, 1991). Even in laboratory studies where people are provided with the probability of receiving a card during a game of chance (e.g., “5 out of 10 of these cards are marked), people are more likely to judge that they have the marked card if it means they will win than if it means they will lose (Lench, 2009; Marks, 1951). Despite the plethora of evidence that people are consistently optimistic, the causes of optimism are not well understood.

Several recent studies have suggested that optimism is the result of affective reactions to potential future events. Affective reactions are brief positive or negative responses to stimuli that guide behavior. In one series of studies, initially neutral events were judged as more likely to occur if they had been subliminally paired with positive stimuli and less likely to occur if they had been paired with negative stimuli (Lench, 2009). For example, participants judged that they were less likely to experience an innocuous event, such as working for a relative, if the word “relative” had been subliminally paired with pictures of a snarling dog than cute puppies. Optimistic judgments were reduced or eliminated when people believed that their affective reactions could be due to something other than the future events (e.g., some participants were told that the lighting in the room might make them feel good or bad). This process also guided behavioral choices. Participants optimistically judged that they were unlikely to experience symptoms from a potential health threat (formaldehyde exposure) if negative words had been subliminally flashed while they learned about the risk than if neutral words had been flashed (Lench, 2008). They also recommended that less money be spent to prevent the risk and were less likely to seek information about how to reduce their personal risk. Overall, these studies experimentally demonstrated that affective reactions are the basis for optimistic thinking.

Affective reactions normally guide behavior in such a way that people pursue positive stimuli and avoid negative stimuli (Damasio, 2003; Slovic & Peters, 2006). This works quite well when people are navigating a complex environment full of risks and rewards. However, people are cognitively complicated creatures and are able to imagine events that are not currently occurring and to have emotional reactions to those possible events. When people react to a possible future event rather than a presently occurring event, the easiest response to positive reactions is to decide the event will happen and the easiest response to negative reactions is to decide the event will not happen. By using this strategy of cognitive acceptance or avoidance, people do not even have to take action to ensure or prevent the event from occurring –

they have simply decided that the future will be consistent with their desires. This unfounded optimism is likely adaptive when events are distant in space or time because people's current actions will have little effect on such remote outcomes. When events are proximal, however, simply assuming that good things will happen and bad things will not may backfire as people fail to take action to either make the event occur or prevent it from happening. It is therefore useful to examine ways to reduce optimism when necessary to encourage healthier or more rational behavior.

## **REDUCING OPTIMISM THROUGH EMOTIONAL MEANS**

Although optimism appears to result from automatic and emotional processes, there is recent evidence that people can reduce their optimism in some situations. Based on dual process and recent regulatory theories, it was hypothesized that people would be less optimistic if they had strong emotional responses to possible future events compared to weak responses because strong responses would motivate people to think carefully about the future (Lench, Davis, Bench, Herpin, & Sweeney, 2010). If people really want an event to happen or not to happen, it behooves them to think carefully about the event. That way, they can take action to ensure or prevent the event and they can also prepare themselves for the possibility that they may not attain the desirable outcome or might have to persevere through the negative outcome. Think of a student nervously waiting to find out their final exam grade – most students are pessimistic in this situation as they ponder all the possible outcomes and their answers (Shepperd, Ouellette, & Fernandez, 1996).

A series of laboratory studies supported this hypothesis and gave insight into the strategies that people can employ to reduce their optimism (Lench et al., 2010). In these studies, participants played a game and made judgments about whether or not they would receive a marked card. The outcome associated with getting the marked card varied between participants – the card could result in a strong positive outcome (winning an extra credit in their class), a weak positive outcome (winning the game), a strong negative outcome (listening to a loud screeching noise), or a weak negative outcome (listening to a slightly unpleasant noise). Participants were less optimistic when the outcome of the marked card was strongly motivating compared to when it was less motivating. This reduction in optimism was only evident, however, if participants were given time to think about their judgment. This

suggested that whatever participants were doing to reduce their optimism took time and probably effort. Subsequent studies showed that optimism was reduced when participants intentionally directed their attention away from their feelings about the game and the outcomes of the game. These recent findings suggest that optimism can be reduced through a process akin to emotional regulation strategies that people would use to reduce any unwanted emotional responses (such as controlling the urge to consume a plate of brownies). This novel understanding suggests possible interventions that could be used at an individual level or through public service announcements to encourage healthy and rational behavior. If the government wished to encourage people to wash their hands to reduce the spread of a virus, for example, a campaign that encouraged people to regulate their emotional reactions to the idea of getting a virus before telling them how to prevent the experience may be effective.

## **IMPLICATIONS OF AN EMOTIONAL PROCESS**

Conceptualizing optimism as an emotional response to potential future events has important implications for improving people's health, wealth, and well-being. Perhaps most importantly, this conceptualization suggests that simply providing people with more information about their risks or making them aware of the dangers of optimism in some situations is unlikely to be effective (Weinstein & Klein, 1995). Billions of dollars are spent every year trying to convince people to make better decisions in regard to their health, financial, and personal decisions and seeing optimism as an emotional, rather than a rational, response suggests this money is not being used effectively. The most pressing societal crises today involve personal decisions about what to eat, when to exercise, and what to consume (e.g., smoking, drinking alcohol). Billions of dollars in health care costs and years of longevity could be increased and better utilized if people made rational decisions in their daily life. Health programs often focus on providing information to people about risks and often attempting to frighten people about what may happen to them as a consequence of their actions. The present analysis suggests that campaigns that attempt to inform are unlikely to be successful and campaigns that attempt to frighten may actually backfire and increase optimism and unhealthy behavior. An appeal to people's more rational side and explicit

encouragement to set aside feelings and emotional reactions may increase the effectiveness of such campaigns.

In the current economic climate, the importance of financial decisions cannot be overstated. Financial decisions are often considered to be the result of a rational consideration of the likelihood of negative consequences of the decision (e.g., interest rates, debt) versus the likelihood of positive consequences of the decision (e.g., immediate benefits, lifestyle choices). Understanding that people rely on emotional input, rather than rational information, regarding their economic choices has important implications for the decisions people make about their personal finances. People will always choose immediate reward regardless of long-term consequences unless they have reason to anticipate the long-term consequences of their decisions – decision models cannot assume that people will rationally consider all information. In the current framework, people underestimate the likelihood that they will experience long-term consequences because they have an automatic, emotional reaction to the future events. Many campaigns focus on simply informing people that their choices are wrong, yet the current conceptual understanding of optimism suggests a different course. Encouraging people to control those initial impulses may be the most effective means to reduce optimism regarding future decisions.

People often make decisions that are contrary to their overall well-being – they drink the extra martini, eat the extra hamburger, make the extra bet on the roulette wheel. Yet we are all capable of making more rational decisions and often even recognize that our behavior is fool-hardy (while we continue to engage in the behavior). The present investigation suggests that a focus on using specific emotion regulation strategies, rather than deploying intentional will-power, may be the most beneficial. People can control their behavior, but it may take emotion regulation strategies to make it seem worth doing so.

## CONCLUSION

Where does optimism come from? Evidence suggests that people are optimistic because of their automatic tendency to decide that events that make them feel positively are likely to occur and events that make them feel negatively are unlikely to occur. It also appears that optimism can be increased or decreased by changing the intensity of affective reactions or the extent to which people focus on their emotional reactions to future events. This

conceptualization offers insight into the foundations of optimism as well as ways to leverage optimism to allow people to attain the best possible outcomes.

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*Chapter 9*

**AUTOMATIC OPTIMISM: THE ROLE OF  
DESIRE IN JUDGMENTS ABOUT THE  
LIKELIHOOD OF FUTURE EVENTS\***

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**ABSTRACT**

The tendency to believe that the future will be consistent with desires is perhaps the best documented bias that influences human thought. Despite decades of research on this desirability bias, very few studies have addressed what is meant by desire or how desires influence judgments about the future. The goal of this chapter is to provide a novel theoretical framework from which to understand why and when people are optimistic about the future and to report results from three studies that examined whether the desirability of future events changes how people evaluate objective probabilities about the likelihood of those events. Two studies examined the influence of desire on the use of probabilistic

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information in judgments about the likelihood of future life events (such as winning awards, developing cancer) and judgments about chance events (winning a game, losing a game). A third study explored whether people use probabilistic information differently when they make judgments about their own future versus the futures of others. Consistent with predictions based on a dual process framework, people judged that positive events were more likely to occur than negative events with the exact same objective probability of occurrence and they interpreted probabilistic information more loosely when they made judgments about their own futures versus the futures of others. These findings suggest that people take remarkable liberties with supposedly objective information in order to judge that their own future will be ideal.

“What a man believes upon grossly insufficient evidence is an index into his desires – desires of which he himself is often unconscious. If a man is offered a fact which goes against his instincts, he will scrutinize it closely, and unless the evidence is overwhelming, he will refuse to believe it. If, on the other hand, he is offered something which affords a reason for acting in accordance to his instincts, he will accept it even on the slightest evidence. The origin of myths is explained in this way.”

-Bertrand Russell

## INTRODUCTION

People have a nearly universal tendency to believe that their futures will contain more positive events than negative events and that life will generally work out in their favor. This personal myth has gone by a number of different names – the desirability bias, optimism, optimistic bias, unrealistic optimism, wishful thinking, and the illusion of unique invulnerability, to name a few – and hundreds of studies have documented the tendency to judge that what is desired is also likely to occur. The essential finding is that people generally believe that positive events will occur in their futures and negative events will not occur. This desirability bias appears to be remarkably resistant to attempts to mitigate or reduce it by professionals interested in encouraging more rational and healthful behavior (e.g., Weinstein & Klein, 1995). The desirability bias has received a great deal of research and media attention because beliefs about what is likely to occur in the future have an impact on people’s current choices, emotions, and reactions to others. The belief that one is unlikely to have a heart attack, for example, can lead people to eat unhealthily, refuse to take prescribed medications, fail to recognize symptoms,

experience anger when presented with information on the dangers of their behaviors, and regard similar others who do change their behavior as unreasonable. Despite decades of evidence that judgments are influenced by the desirability of the event and that beliefs about the future are central to understanding human thought and behavior, relatively little is understood about why desires influence people's beliefs about what is likely to occur in the future.

Classic theories of judgment and decision making, as well as common sense, suggest that people base their judgments about the likelihood of an event on objective evidence. This objective evidence typically includes a probability that is supplied by an outside source or the base rate of the event in a population (e.g., Edwards & Von Winterfeldt, 1986; Kahneman & Tversky, 1979; Luce & Ruffia, 1957; Savage, 1954). Indeed, the presentation of this sort of objective evidence is frequently employed to try to encourage rational behavior. News programs, health professionals, investment consultants, and many other professionals attempt to encourage healthier and reasonable behavior by providing information on the chances of natural disasters, health risks, stock up-turns or down-turns, and a milieu of other potential outcomes.

Mental time travel is difficult, however, and people may not be terribly adept at applying this objective information to predict what is likely to happen in their personal future (Tulving, 2002). What if people do not treat the probabilistic information supplied by well-intentioned professionals as objective information? What if their tendency to judge that the future will be consistent with their desires overwhelms any objective information that might be presented? If this were the case, it would invalidate the common method of providing objective information to people who are at risk as well as reveal how people process information about potential future events. The goal of this chapter is to provide a novel theoretical framework from which to understand why people are optimistic about the future and to report results from several studies that examined whether desire changes how people evaluate objective probabilities about the likelihood of future events.

## **The Desirability Bias in Judgment**

Judgments about the likelihood of future events have been of particular interest in theories of judgment and decision-making. According to many of these theories, people's decisions can be predicted by multiplying the value of the event by the perceived likelihood of the event (based on objective evidence

such as probabilities; Edwards & Von Winterfeldt, 1986; Kahneman & Tversky, 1979; Luce & Ruffalo, 1957; Savage, 1954). For example, the decision of a drug addict to pursue his drug of choice can be predicted by considering the value of related factors (e.g., current need for the drug) by the perceived likelihood of related factors (e.g., likelihood of satisfaction; likelihood of being arrested). Any decision can be similarly predicted by knowing the value of the event and the perceived likelihood of the event. This equation presumes that value is independent of perceived likelihood and violations of this presumption should result in decisions that cannot be predicted by decision theories. In other words, the hypothetical addict will, of course, be more likely to pursue the drug in a current state of withdrawal compared to shortly after a recent dose. But if the value of the drug also impacts the perceived likelihood of associated outcomes, such that potential arrest seems less likely to an addict in withdrawal than to one who recently took a dose, then these theories will fail to predict decisions because the addict has, in a sense, discounted the objective likelihood of arrest because of the value of the drug.

Evidence suggests that the value and likelihood of future events are not independent because people frequently judge that the future will be consistent with their desires (e.g., Babad & Katz, 1991; Weinstein, 1980). In studies of beliefs about the likelihood of various life events, people judge that they are at above average risk to experience desirable events and below average risk to experience undesirable events (Weinstein, 1980; Weinstein & Klein, 1995). This bias has been termed unrealistic optimism, because, statistically, not everyone can be at above average risk for positive events or below average risk for negative events (Weinstein, 1980). Although these studies appear to give evidence that likelihood judgments are biased by the desirability or value of the event, the studies are correlational in nature. This has made it difficult to determine whether the desirability of the event is actually causing bias in likelihood judgments. One related problem arises from the fact that some people really are at an advantage and will be more likely to experience positive events and less likely to experience negative events. Studies typically do not measure any particular individual's level of risk and thus it is not possible to know whether any particular individual is making unrealistically optimistic judgments. In addition, positive events really are more likely to occur than negative events. Thus judgments that appear biased by the desirability of events may actually be a reflection of realistic differences in risk and attempts to objectively evaluate a limited amount of information.

The strongest evidence that desires influence judgments about the likelihood of future events comes from studies that give an external positive or

negative value to an outcome in games of chance. For example, participants might win or lose a game based on whether they received a marked card (Bar-Hillel & Budescu, 1995; Lench & Ditto, 2008; Marks, 1951). Participants in these studies judge that they are more likely to receive a positive outcome (a winning card) than a negative outcome (a losing card) with the same objective probability of occurrence. This effect is generally limited to intermediate levels of probability, where the person has, for example, a 50% chance of receiving the marked card (Krizan & Windschitl, 2007). In such an ambiguous situation, it is unclear whether people are using their desires to judge the likelihood of future events or simply making judgments that allow them to feel positively when there is no compelling reason not to do so (Schneider, 2001). There is some evidence that people may also interpret less ambiguous probabilities (e.g., 40% and 60%) optimistically, but few studies have asked participants to make judgments about the likelihood of future events associated with a range of probabilities (Krizan & Windschitl, 2007).

In summary, judgments are biased in the direction of desires, but previous methodologies have left it unclear whether the desirability of the event changes how people interpret objective information about the likelihood of the event. Without knowledge about whether judgments are biased by desires, and, if so, how this occurs, it is not possible to investigate when judgments are biased or identify factors that may help decrease the desirability bias and its impact on decisions.

## **A Dual Process Model of Likelihood Judgments**

Dual process models have become increasingly popular in many areas within psychology to illustrate the processes that influence human judgment and behavior. We propose a framework, based on these models, that offers a novel perspective from which to consider explanations of how people make judgments about the likelihood of future events. Figure 1 presents a rough illustration of the influence of the dual systems on judgments about the likelihood of future events, represented by J in the figure. The experiential system (i.e., System 1), represented by E in the figure, processes information in a manner that is relatively rapid, effortless, holistic, and based on affect and evaluative reactions (Epstein, 1994; Kahneman, 2003). The analytic system (i.e., rational system; System 2), represented by A in the figure, processes information in a manner that is relatively slow, effortful, systematic, and based on cognitive analysis and evidence (Epstein, 1994; Kahneman, 2003). Both

systems can and do influence judgments and behavior. Everyone has experienced the impact, sometimes unwillingly, of the experiential system. Who hasn't suddenly been overwhelmed by the urge to consume a tasty dessert that has entered view, regardless of any dietary restrictions or plans to avoid high calorie food? Similarly, everyone has experienced the influence of the analytic system as they plan to take particular action or consider the pros and cons of various decisions before taking action.

The framework above also indicates some of the relationships among the two systems and judgments. First, dual process models suggest that these two systems operate in parallel, but people spend the least possible amount of effort thinking about most decisions and thus the faster and subjectively more compelling experiential system often disproportionately influences judgments (e.g., Einhorn & Hogarth, 1981). People often report that they recognize a logical response, but simply feel compelled to answer illogically because of powerful emotional reactions (see Epstein, 1994, for a review). For example, people "know" that a small mouse does not pose a legitimate threat, but many flee from the path of the fearsome animal (Epstein, 1994). In Figure 1, the relatively large impact of the experiential system is represented by the thicker line running from experiential processing to judgment. Second, the two systems are interactive and influence one another while people are considering a decision, but the relatively fast and compelling experiential system is again disproportionately likely to influence the analytic system than vice versa, shown in the Figure by the thicker line running from experiential processing to analytic processing (Ajzen & Sexton, 1999; Epstein & Pacini, 1999; Leventhal, Safer, & Panagis, 1983). The impact of experiential processing on the analytic system is strikingly evident when people recruit reasons that their desired conclusion is correct. In one study, for example, people recalled more instances of past sociable behavior if they were led to believe that extraversion was associated with positive outcomes whereas people recalled more introverted behavior if they were led to believe that introversion was associated with positive outcomes (Sanitioso, Kunda, & Fong, 1990). Of course, the analytic system also influences the experiential system and this is evident any time that people inhibit their automatic tendencies, but this route appears to take more effort and is relatively unlikely to occur (Lench, Herpin & Sweeney, 2008).



Figure 1. A Dual Process Model of Risk Judgments

The dual process framework has implications for how people respond to objective information about the likelihood of future events. The experiential system does not appear to deal effectively with some types of probabilistic information. For example, participants who could win money for drawing a red jellybean preferred to pick from a bowl that contained more red jellybeans with poor odds than a bowl with fewer red jellybeans but better odds (Denes-Raj & Epstein, 1994). Participants reported that they knew the odds were against them, but just “felt” that their chances were better from the bowl with more red jellybeans. This is not to say that people universally ignore all probabilistic information. When people judge the likelihood of future events, there tends to be a moderate correspondence between an individual’s actual level of risk or the perceived base rate of the event and their judgments about whether they will experience the event (McKenna, Warbuton, & Winwood, 1993; Price, Pentecost, & Voth, 2002; Rothman, Klein, & Weinstein, 1996). The way in which the probabilistic information is provided may determine the extent to which people use probabilistic information when making their judgments. Slovic, Monahan and MacGregor (2000) found that psychologists and psychiatrists judged a patient to be more dangerous overall when the probability of violence by similar patients was presented using frequencies (e.g., one out of 10 patients is violent) compared to probabilities (e.g., 10% chance of violence). They suggest that this effect is the result of an experiential system that reacts more strongly to a single possible event than to the probability of an event. Rather than analyzing the probability information objectively, participants appeared to base their judgment on the concrete image of a dangerous person elicited by a frequency but not a probability. Together these findings suggest that people are particularly likely to disregard probability information when they are using experiential processing, unless it is presented in a way that elicits a concrete image.

## **Automatic Optimism**

Although the dual process model outlined above no doubt simplifies the interactions between the two processing systems, the framework can be used to examine different explanations for the desirability bias in judgment. We propose that judgments about the likelihood of future events may be based directly on affective reactions to those events. Affective reactions are quick evaluations that mark stimuli as positive and desirable or negative and undesirable (e.g., Lench, under revision; Slovic & Peters, 2006). In terms of the outlined dual process model, experiential processing may directly influence judgment without necessarily involving the analytic system. When faced with a potential future event, people may consult their immediate affective reaction to the event. If their reaction is positive, they may decide that the event is likely; if their reaction is negative, they may decide the event is unlikely. Newlyweds trying to estimate how much insurance is needed, for example, are likely to have a negative affective reaction to the idea of the spouse dying and as a result of that reaction judge that the spouse is unlikely to die and purchase less insurance. We have termed this proposal automatic optimism because of the basic proposition that the desirability bias is the result of automatic affective reactions generated by the experiential system (Lench & Ditto, 2008).

Why might affective reactions be sufficient to create the desirability bias in judgment? Positive affective reactions to stimuli generate tendencies to approach information and stimuli whereas negative affective reactions generate tendencies to avoid information and stimuli (e.g., Damasio, 2003; Frijda, 1987; Peters & Slovic, 2000). For example, people learn to avoid risky gambles by relying on their negative affective reactions even before they can consciously explain why they are avoiding the gamble (Bechara, Damasio, Tranel, & Damasio, 1997). When judging the likelihood of future events, we propose that people can embrace positive events and reject negative events by believing that the positive events are likely to occur and the negative events are unlikely to occur (Lench, 2008). The simplest and most direct way to accept or reject a potential event is to simply judge that it is or is not going to happen – this method does not even require that the person take action to try to promote or prevent the event. Thus events that elicit positive reactions should be judged as likely to occur and events that elicit negative reactions should be judged as unlikely to occur regardless of the objective information given about the likelihood that they will occur.

## Other Theoretical Accounts

Several other theoretical accounts have been advanced to explain the desirability bias in judgment or to account for the impact of affect on likelihood judgments. One group of accounts suggests that the desirability bias is the result of non-motivational factors (see Chambers & Windschitl, 2004, for a review). These accounts focus on the analytic process in Figure 1 and generally argue that bias is the result of biased cognitive processes rather than desire for a particular outcome. Kruger and Burrus (2003), for example, found that people judge that they are more likely than average to experience common events, such as owning a car, and less likely than average to experience rare events, such as owning an airplane. This tendency can result in what appear to be overly optimistic or overly pessimistic judgments because people ignore information associated with other people. In contrast to our proposal, these non-motivational accounts suggest that affective reactions make little or no contribution to the desirability bias.

The second group of theoretical accounts recognizes the importance of affective responses, but suggests that negative affect or emotion leads to pessimistic judgments. Several of these accounts predict that positive mood leads to positive judgments and negative mood leads to negative judgments (e.g., Bower, 1981; Forgas, Bower, & Krantz, 1984; Schwarz & Clore, 1983). Johnson and Tversky (1983), for example, found that reading a sad story led participants to judge that various negative events were more likely to occur. Similarly, the emotions of anxiety and dread are associated with more pessimistic judgments (e.g., Loewenstein, Weber, Hsee, & Welch, 2001; see also Slovic & Peters, 2006). Other accounts make similar predictions but suggest that affect changes the quality or quantity of analytic processing, and this processing results in biased judgments. Theories of motivated reasoning, for example, state that people process information in a biased way and this biased information processing leads to biased judgment (e.g., Kunda, 1990). According to these explanations, judgments are based on experiential motivations, but it is the influence of motivations on analytic processing that creates the desirability bias. For example, the newlyweds trying to estimate how much insurance is needed to protect them in the event that one spouse dies may generate reasons that the spouse is unlikely to die (s/he is healthy, conscientious, careful, etc.) and not generate reasons that the spouse is a potential risk. The more reasons that they could generate through analytic processing, the more optimistic their judgment and the less insurance they are likely to purchase. Put in terms of Figure 1, experiential processing influences

analytic processing, and it is this analytic processing that predicts judgment. Thus, greater optimism should result from greater biased processing and should be correctable if people are faced with strong objective evidence about the chances of future events.

## **The Use of Base Rates in Judgments about the Likelihood of Life Events**

Lench and Ditto (2008; Study 1) demonstrated that people interpret the same base rate statistic (e.g., 25% chance of occurring) differently when it is associated with a desirable event than an undesirable one. Participants definitely paid attention to the base rates and judged that high base rate events were more likely to occur than low base rate events. Within this general backdrop of accuracy, however, there was a consistent tendency for people to judge that positive events were more likely than negative events with the exact same base rate. Similarly, other studies have found that participants judged that they were more likely to receive positive than negative medical feedback despite identical chances of receiving either feedback (Ditto, Munro, Apanovitch, Scepanisky, & Lockhart, 2003).

People often rely on base rates that are not statistical to make decisions, however. For example, a physician may tell patients that it is “very unlikely” that they will suffer side effects from a prescribed medication or tell a patient’s relatives that “most patients” recover fully from a dangerous operation. On one hand, people may not be very experienced using numerical statistics and the effect of desirability in the prior study might be reduced if participants were provided with more familiar and comprehensible verbal probability descriptors. On the other hand, verbal base rates may be even more ambiguous than numerical base rates (Budescu & Wallsten, 1985; Cohen & Wallsten, 1992), and thus it might be argued that they would be equally susceptible to biased interpretation. We hypothesized that participants would be sensitive to these verbal base rates in their subjective likelihood judgments, but would still perceive positive events as more likely to occur to them than negative events associated with the same base rate.

Participants were 120 undergraduate students who took part in large groups for course credit. They judged their likelihood of experiencing 24 life events (see Table 1; Lench & Levine, 2005; Weinstein, 1980). Twelve positive and 12 negative life events were rated (versions of each event were counterbalanced between participants). Instructions given at the start of the

study explained that participants would receive information about the prevalence of each event based on surveys, census data, and statistical projection. Base rates were given for each event in verbal form (e.g., “Most U.S. college students will like/dislike their first post graduation job”). High, medium, or low base rate descriptors were given for each event, based on the average statistical probability people assign to verbal probability terms (Brun & Teigen, 1988; Budescu & Wallsten, 1985; Budescu, Weinberg, & Wallsten, 1988; Hamm, 1991). High base rate terms included “most”, “significant chance”, and “very likely”. Medium base rate terms included “some”, “moderate chance”, and “possible”. Low base rate terms included “only a few”, “rarely”, and “improbable”. Participants then rated their likelihood of experiencing the events by assigning percentages ranging from 0% to 100%.

As can be seen in Table 1, participants showed a consistent pattern of rating positive events as more likely to occur than negative events that were associated with identical information regarding their probability of occurrence. For 17 out of 24 events participants rated that the positive version of the event was significantly more likely to occur than the negative version, even though both were described with the same probability term.

A 3 (base rate: high, medium, low)  $\times$  2 (valence: positive, negative) repeated measures ANOVA confirmed the results of the item-based analyses. Participants were sensitive to base rate information,  $F(2,234) = 38.97, p < .001$ , with participants judging high base rate events ( $M = 46.00, SD = 14.03$ ) to be more likely than medium base rate events ( $M = 42.99, SD = 11.87; t(119) = 2.88, p < .01$ ), and these as more likely than low base rate events ( $M = 35.89, SD = 11.39; t(119) = 5.14, p < .001$ ). Participants' prevalence estimates were also affected by valence, with positive events judged as significantly more likely ( $M = 51.76, SD = 12.73$ ) than negative events ( $M = 31.67, SD = 11.51$ ),  $F(1,117) = 162.46, p < .001$ . Consistent with predictions, these findings suggest that people interpreted base rate information differently when they were asked to judge events that were desirable versus undesirable.

There also was a significant base rate by valence interaction,  $F(2, 234) = 11.01, p < .001$ . Participants judged high base rate positive events ( $M = 54.71, SD = 20.06$ ) as significantly more likely than medium or low base rate positive events,  $t_s(118) > 2.09, p_s < .05$ , but judged medium ( $M = 50.86, SD = 16.15$ ) and low base rate positive events ( $M = 49.74, SD = 18.69$ ) as equally likely. Participants judged negative events with a low base rate ( $M = 22.45, SD = 14.90$ ) as significantly less likely than medium or high base rate events,  $t_s(119) > 6.97, p_s < .001$ , but judged medium ( $M = 35.13, SD = 15.70$ ) and high base rate negative events ( $M = 37.44, SD = 17.83$ ) as equally likely. This

interaction suggests that participants were particularly accepting of base rates that matched desires (more likely positive events and less likely negative events), consistent with our predictions.

**Table 1. Mean Subjective Likelihood of Events**

Base Rate	Positive	Mean	Negative	Mean
High	Like first postgraduation job	56.37	Dislike first postgraduation job	49.23
	Do better in classes than expected this quarter	52.88*	Do worse in classes than expected this quarter	42.14*
	Travel overseas	79.75*	Never travel overseas	13.02*
	Never be unemployed	39.14	Be unemployed at some point	47.73
	Never be burglarized	40.78	Be a victim of burglary	44.32
	Never have a bout of serious depression	45.53	Have a bout of serious depression	48.93
	Never divorce	65.30*	Divorce	27.48*
	Never develop asthma	56.93*	Develop asthma	25.02*
Medium	Own your own home	86.37*	Never own your own home	19.87*
	Starting salary over \$60,000	41.63	Starting salary under \$30,000	37.17
	Not spend a night in the hospital	39.45*	Have an extended stay in the hospital	25.12*
	Never suffer from severe anxiety	56.43*	Suffer from anxiety	25.12*
	Avoid two or more days ill in bed in the next year	50.83*	Be ill in bed two or more days in the next year	34.60*
	Remain cancer free	47.63	Get cancer	46.48
	Never exposed to low level radiation	60.36*	Be exposed to low level radiation	37.39*
	Never have property damaged by a natural disaster	47.31*	Have property damaged by a natural disaster	33.53*
Low	Have a gifted child	50.68*	Have a mentally retarded child	12.97*
	Live past 90	40.28*	Die before 40	21.25*
	Not become ill all winter	37.13*	Have a significant illness this winter	21.54*
	Never have a heart attack	48.66*	Have a heart attack by age 40	24.24*
	Graduate from college in five years or less	84.08*	Never graduate from college	7.83*
	Be free from gum disease	53.07*	Have serious gum disease	21.72*
	Never break a bone	45.00*	Trip and break a bone	25.75*
	Never have wallet stolen	39.43	Have wallet stolen and major charges made	46.26

Note. \*  $p < .05$ , from independent sample t-tests conducted between each positive and negative version of events.

Overall, the results suggest that base rate information, though by no means summarily ignored, is interpreted differently depending on the desirability of the associated outcome. The same probability was seen as indicating that a positive event might occur and a negative event might not occur.

### **The Use of Base Rates in Judgments about the Likelihood of Chance Events**

One limitation of the traditional method of examining optimism by having participants make judgments about actual life events is that participants may enter the study with strong subjective perceptions about their likelihood of experiencing the events. Our college student participants are more likely than most to have experienced a life more populated by positive than negative events (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001) and have abilities that compare favorably with those of most other people they encounter. As such, many are likely to enter our studies with a strong subjective sense, based on the evidence provided by their life to date, that they really are more likely to have a gifted child than a retarded one, more likely to travel overseas than not, and more likely to experience positive than negative health outcomes. These subjective (but at least in part rational) feelings may simply overwhelm the provided base rate information when participants generate their likelihood estimates. This explanation is more compelling for some of the events used in the previous study than for others, and is perilously similar to the very optimism effect we propose, but nonetheless, a more compelling case for the biased interpretation of base rates would be made if individuals were forced to make likelihood estimates about events in which prior experience could not be used to generate their judgments. We thus sought to create a situation with no history, where participants had no evidential basis to generate prior expectations for positive outcomes. Our goal was to create an experimental procedure conceptually similar to the “minimal intergroup situation” used by Tajfel and colleagues (e.g., Tajfel, Billig, Bundy & Flament, 1971) to examine stereotyping and prejudice processes. To create this “minimal optimism situation,” participants played a simple game of chance with both the desirability of outcomes (gaining or losing a point) and the objective probability of the outcome being manipulated (Irwin, 1953; Marks, 1951).

Participants were 80 undergraduate students who took part individually for course credit and chances to win a gift certificate. Participants were told that we were interested in how people assessed probabilities in gambling

situations and that they would be playing a simplified version of the common card game “blackjack.” As in the standard game, the goal of the laboratory game was to reach a card count of 21. In the laboratory game, however, each hand was played with a deck of ten cards consisting of only 10s and 2s. Participants started each hand with an ace (assigned a value of 11) and could be dealt one card. Thus a 10 was a winning card and a 2 was a losing card.

**Table 2. Percentage of participants stating they had the card by probability**

	1/10	3/10	5/10	7/10	9/10
Negative	3%	3%	38%	93%	98%
Positive	3%	10%	65%	100%	100%

Participants were randomly assigned to one of two conditions. In the positive frame condition, participants judged whether they had received the winning card (e.g., “In this deck there are 3 out of 10 winning cards. Do you think you have a winning card?”) and were told that every time they won a hand they would receive an entry into a raffle for \$100 gift certificate. In the negative frame condition, participants judged whether they had received the losing card (e.g., “In this deck there are 3 out of 10 losing cards. Do you think you have a losing card?”) and were told that every time they lost the hand they would lose an entry into the raffle from an initial allotment of five entries.

Participants played the game a total of 5 times. Each time they were dealt a card, face down, from a deck of 10 cards and given one of five base rates for receiving the winning or losing card (1/10, 3/10, 5/10, 7/10, 9/10). The order of these base rates was counterbalanced across participants. After each hand, participants predicted whether they believed they had received the winning/losing card but were not told whether or not they did. After the session, participants were thoroughly debriefed and each was given one entry into the raffle for the gift certificate.

Table 2 presents the percentage of participants who predicted that they had the winning or losing card for each base rate trial. To analyze these data across base rates, the stated probability of having the target card (1/10, 3/10, 5/10, 7/10, 9/10) was a repeated measure for each person. Logistic regression analyses, clustered by person, were then conducted with probability and valence framing (positive, negative) entered simultaneously as predictors of whether participants said they had the card. As in the previous study, participants were sensitive to the probability information ( $OR = 3.76$ ,  $CI: 2.92$

to 4.81,  $p < .001$ ). That is, with every 1/10 increase in the odds of receiving the target card, 376% more participants stated that they had the card. Participants' judgments were also, however, influenced by the valence framing of the judgment ( $OR = 3.18$ ,  $CI: 1.42$  to  $7.17$ ,  $p < .01$ ). Participants were, on average, over 3 times more likely to predict that they had received the target card if they were asked to judge whether they had received a winning card than if they were asked to judge whether they had received a losing card. The effect of the valence framing on predictions is striking given participants' general sensitivity to the provided base rate information, and the fact that in the minimal situation we created, participants really had no other information available to them on which to base their predictions.

The logistic regression also revealed a significant interaction effect of base rate and valence ( $OR = 1.25$ ,  $CI: 1.18$  to  $1.32$ ,  $p < .001$ ). As can be seen in Table 2, the effect of valence was less pronounced when participants were provided with extreme probabilities (e.g., 1/10 and 9/10) than when more intermediate probabilities were provided. Optimism was particularly evident with the 5/10 probability. When told that they had a 50/50 chance of The logistic regression also revealed a significant interaction effect of base rate and valence ( $OR = 1.25$ ,  $CI: 1.18$  to  $1.32$ ,  $p < .001$ ). As can be seen in Table 2, the effect of valence was less pronounced when participants were provided with extreme probabilities (e.g., 1/10 and 9/10) than when more intermediate probabilities were provided. Optimism was particularly evident with the 5/10 probability. When told that they had a 50/50 chance of having a winning card, 65% of participants predicted that they had it, but when told they had a 50/50 change of having a losing card, only 38% of participants predicted that they had it. In contrast, when participants were confronted with probability information that clearly suggested it was either overwhelmingly likely or unlikely that they had the target card, little or no effect of valence framing was found. This pattern is consistent with past research suggesting that various forms of bias reveal themselves most clearly under conditions of stimulus ambiguity (e.g., Dunning, Meyerowitz, & Holzberg, 2002; Krizan & Windshitl, 2007).

## **The Source of the Desirability Bias**

These two studies suggest that objective evidence about the likelihood of potential events is evaluated differently when the event is positive versus negative. Additional evidence for the processes underlying this bias comes

from other studies conducted in our laboratory. Lench and Ditto (2008) found that people judged that positive events were more likely than negative events even when the events were equally likely to occur. Further, this desirability bias was not reduced when participants were offered incentives for accurate judgments. In this study, participants could win a chance for a prize if they received the winning card or did not receive the losing card. They could also win a chance for the prize if they guessed correctly whether they had the winning or losing card. Thus, the study pitted the desire to win against the desire to be accurate. The desirability bias was identical regardless of whether people were offered incentives for accuracy or not. In another study, participants were forced to judge whether events were likely to occur in either one second or ten seconds. The desirability bias was enhanced when participants were forced to answer quickly compared to when they had time to consider their judgment. Finally, participants made judgments about potential future life events while affectively positive words (e.g., love, smile) or negative words (e.g., hate, loss) appeared in the corner of the screen. Participants were told that these words were the result of a glitch and to ignore them. The results revealed that participants were more optimistic when they judged the likelihood of positive events in the presence of positive words and judged the likelihood of negative events in the presence of negative words. These findings suggested that the desirability bias was due to a process that was difficult to correct, fast, and related to affective processes. Our proposal that people base their likelihood judgments directly on affective reactions to future events would be just such a process.

Additional studies also provided evidence that affective reactions cause the desirability bias in judgments about the likelihood of future events (Lench, 2008). In these studies, initially neutral life events were subliminally paired with positive, negative, or neutral stimuli. Compared to the neutral conditions, the same initially neutral event was rated as more likely to occur if it elicited a positive affective reaction and less likely to occur if it elicited a negative affective reaction. These effects were mediated by self-reported affective reactions to the stimuli and not accounted for by general emotional reactions or motivated reasoning. Further, the desirability bias was reduced or eliminated when participants could misattribute their affective reactions to a source other than the future events. If affective reactions were blamed on the experimental room, the desirability bias was no longer evident for laboratory events that were primed to elicit affective reactions and was reduced in judgments about the likelihood of other life events. Together, these studies

demonstrate that the desirability bias is caused by affective reactions to events and that this bias arises from automatic processes that are difficult to correct.

## **Judgments for Self and Others**

The evidence presented and reviewed thus far suggests that people rely on their emotional reactions, and discount objective information, when judging the likelihood of future events. It is not clear, however, whether this bias is the result of a general bias to believe that positive events are more likely than negative events or whether people make biased judgments only to events in their own future that elicit affective reactions. One way to distinguish these possibilities is to compare judgments about one's own future and judgments about the future of another person. The value of a potential future event does not change based on who will receive the consequences of the event. For example, winning the lottery is generally regarded as a positive event regardless of whether you win or someone else wins. What does change, however, is the likelihood that people will have an affective reaction to the potential event. The possibility that a stranger may win the lottery, for example, likely does not generate the same level of enthusiasm and positive affect as the possibility that you may win the lottery. If the desirability bias is the result of affective reactions, as we propose, the bias should be most evident in judgments about the likelihood of events in one's own future compared to judgments about the future of another person. There is limited evidence that people take longer to respond, and thus may be thinking more analytically, when making judgments for other people compared to judgments for themselves (Aucote & Gold, 2005).

A standard question format in the unrealistic optimism literature asks participants to judge their risk of experiencing positive and negative events compared to an average person (e.g., Weinstein & Lachendro, 1982; Weinstein, 1980). Studies that use this question format have demonstrated that people tend to judge themselves to be at above average risk for common events and below average risk for rare events. This pattern is driven by people tending to focus only on their own chances of experiencing a particular outcome and ignore the chances of other people (Kruger & Burrus, 2004). Indeed, people make different, and typically less optimistic, judgments when they are forced to consider another person by the order of the question (e.g., when asked, "is the average person more likely than you to..."; Hoorens, 1995) or separate questions about their own chances and the chances of

another person (Aucote & Gold, 2005; Buger & Burns, 1988; Radcliffe & Klein, 2002). When forced to consider the risk of others by the question format, people base their judgment on different information when they consider the future of an individual versus a group of people. People consider particular characteristics and behaviors when judging the likelihood that an individual (either themselves or one other person) will experience events, but consider base rate information when judging the likelihood that an average peer or group of people will experience events (Klar, Medding, & Sarel, 1996). In contrast to our proposal that people should discount objective probabilities more for themselves than another person, these findings suggest that people should use similar judgmental criteria for the self or another individual.

Participants played a game like blackjack and made judgments for themselves or watched a game of blackjack and made judgments for another participant. As in the previous study, we were interested in the effects of the desirability of the outcome associated with particular cards. Again, participants had no reason to have prior expectations about their likelihood or another person's likelihood of experiencing the positive or negative event in this minimal situation. We hypothesized that participants would demonstrate a larger desirability bias for the self than for another person and be more likely to discount the probabilities for the self than for another. Further, this effect was expected to be most evident when the situation was somewhat ambiguous and open to interpretation (e.g., an event with 60% likelihood of occurrence). People may be particularly likely to apply the limited evidence optimistically for the self but not for another person when the situation is ambiguous.

Participants were 224 undergraduate students who completed the study in small groups for course credit. Participants played or watched a simplified game similar to "blackjack", a common card game with the goal of reaching 21 points, described above. The participants played or watched the game eight times and each deck of cards had an assigned proportion of winning and losing cards ranging from 1/10 to 8/10 in counterbalanced orders. Receipt of a winning card (10) on each hand indicated that the player would receive a chance to win a \$100 gift certificate. Receipt of a losing card (2) on each hand indicated that the player would lose one of their chances to win a \$100 gift certificate (eight chances were awarded at the start of the game). All instructions and materials were presented on individual computer terminals.

Participants were randomly assigned to one of four conditions in a 2 (outcome valence: positive, negative) by 2 (target: self, other) design. In the positive conditions, judgments concerned winning cards (e.g., "In this deck

there are 2 out of 10 winning cards. Do you think this is a winning card?”). In the negative conditions, judgments concerned losing cards (e.g., “In this deck there are 2 out of 10 losing cards. Do you think this is a losing card?”). In the self conditions, participants were told that they were playing the game and that they would receive a chance at the prize for every received 10 in the positive conditions or lose a chance at the prize for every received 2 in the negative conditions. In the other conditions, participants were told that they were watching a game being played by another participant whom they saw briefly on the way into the lab. This person could win a chance at the prize for every 10 card she received in the positive conditions or lose a chance at the prize for every 2 card she received in the negative conditions. After each hand was dealt, participants judged whether or not the face-down card was a winning or losing card and their certainty in their judgment.

The simplest way to examine judgments for self and others is to determine the number of times participants judged that they or the player had received the card. Participants played the game a total of eight times and thus could judge they had the card anywhere from zero to eight times. Overall, participants judged that they had the card about half the time ( $M = 4.21$ ,  $SD = 1.18$ ). In a 2 (valence: positive, negative)  $\times$  2 (target: self, other) ANOVA, there was a main effect of valence,  $F(1,220) = 56.29$ ,  $p < .001$ . Consistent with previous studies demonstrating the desirability bias, participants judged that the winning card was more likely to be received ( $M = 4.70$ ,  $SD = 1.03$ ) than the losing card ( $M = 3.65$ ,  $SD = 1.09$ ) even though the exact same probabilities were given for both conditions. There was also a main effect of judgment target,  $F(1, 220) = 28.46$ ,  $p < .001$ . Participants judged that the card had been received more often for others ( $M = 4.59$ ,  $SD = 1.01$ ) than for themselves ( $M = 3.91$ ,  $SD = 1.21$ ). This was qualified by an interaction between valence and judgment target,  $F(1, 220) = 11.18$ ,  $p = .001$ . As shown in Figure 2, participants judged that the other person received the losing card more frequently ( $M = 4.29$ ,  $SD = 1.10$ ) than they themselves did ( $M = 3.14$ ,  $SD = .77$ ),  $t(100) = 6.21$ ,  $p < .001$ . Participants judged that the other person received the winning card just as frequently ( $M = 4.84$ ,  $SD = .87$ ) as they themselves ( $M = 4.58$ ,  $SD = 1.14$ ),  $t(120) = 1.42$ ,  $p = .16$ . For negative events then, participants were more optimistic about their own future than the future of another person.

Participants made judgments regarding different probabilities and one of the key questions of the present investigation was how these relatively objective probabilities were interpreted for the self versus another person. A mixed ANOVA was conducted with valence (positive, negative) and target

(self, other) as between-subjects factors and probability (1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10) as a repeated-measure. There was a main effect of probability,  $F(7,1540) = 385.05$ ,  $p < .001$ , indicating that participants were generally sensitive to the provided probabilities when judging whether they had the winning or losing card. There also was a main effect of valence,  $F(1, 220) = 66.17$ ,  $p < .001$ , such that participants generally judged that they and the other person would receive winning cards more than losing cards. Consistent with predictions, there was an interaction,  $F(7,1540) = 3.76$ ,  $p < .001$ . This interaction is depicted in Figures 3 and 4. As shown in Figure 3, more participants judged that they had the winning card for themselves than another person, especially at lower probabilities,  $t(120) = 3.40$ ,  $p = .001$ . As shown in Figure 4, fewer participants judged that they had the losing card for themselves than another person, especially at lower probabilities,  $t(100) = 3.25$ ,  $p = .002$ . Overall, then, it appeared that participants were more willing to believe that they could defy the probabilities than another person.

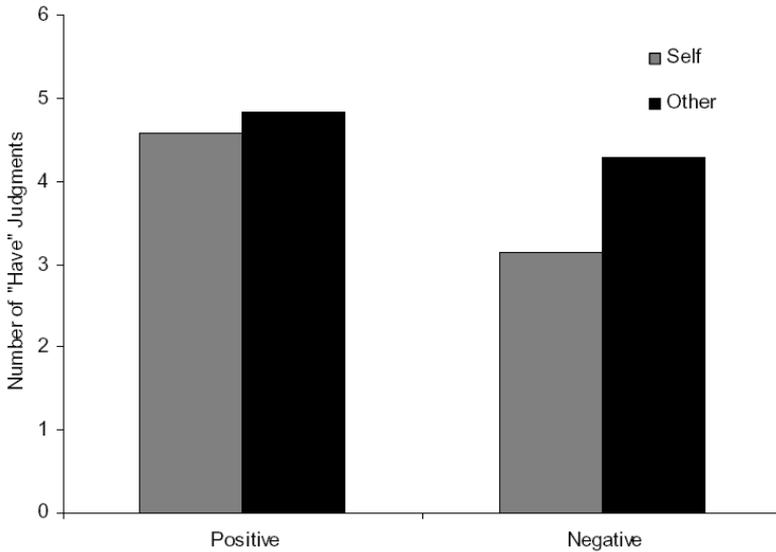


Figure 2. Participants judged that they would receive the losing cards less often than another player

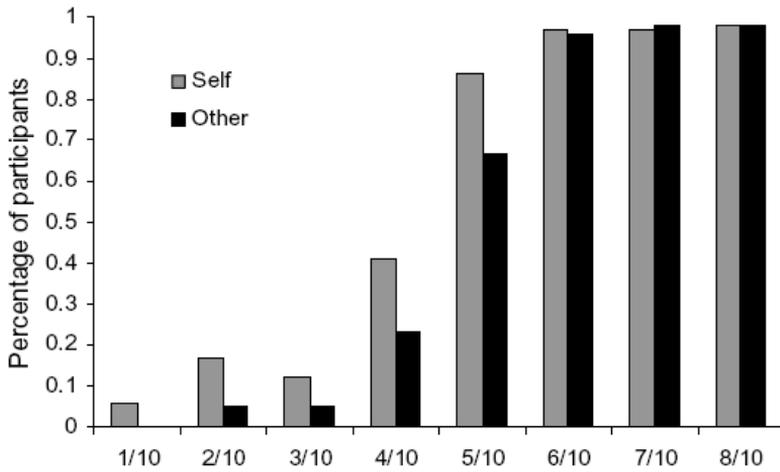


Figure 3. The percentage of participants that judged they or another participant had the winning card

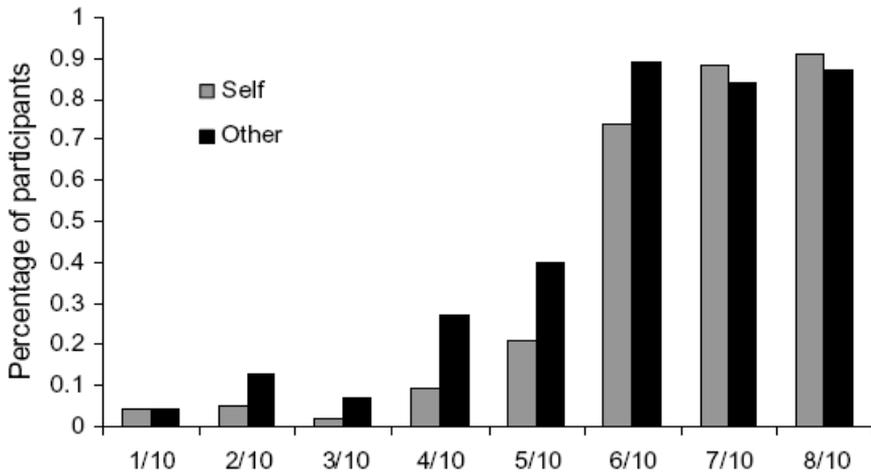


Figure 4. The percentage of participants that judged they or another participant had the losing card

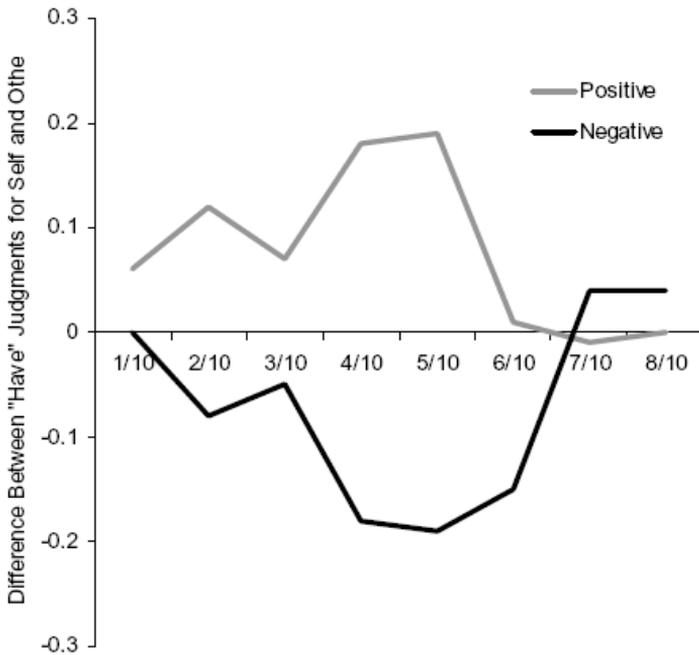


Figure 5. Difference in the percentage of participants who judged that they or another participant had the winning or losing cards

Figure 3 and 4 suggest that participants' judgments were less influenced by the objective probability of receiving a card when they were judging their own future rather than the future of another person. The two previous studies suggest, however, that people are especially biased by their motivations when the evidence is ambiguous. As shown in Figure 5, this also seemed to be the case when people were judging their own likelihood of experiencing events relative to another person. The difference between judgments for the self and another play was larger at the intermediate probabilities (4/10, 5/10, 6/10) for positive and negative outcomes than at lower probabilities (1/10, 2/10, 3/10),  $t(120) = 4.26, p < .001$  and  $t(120) = 15.2, p < .001$  respectively, or at higher probabilities (7/10, 8/10),  $t(100) = 9.45, p < .001$  and  $t(100) = 13.99, p < .001$ , respectively. Thus participants were most likely to make judgments that favored the self when the situation was somewhat ambiguous.

## CONCLUSION

### Implications of Automatic Optimism

Throughout our studies, participants did pay attention to the presented probabilities, but they systematically interpreted them in their own favor. Participants judged that positive events were more likely than negative events even when the two events were objectively equally likely to occur. This tendency does not appear to be the result of “strategic optimism”, whereby people are optimistic in order to intentionally increase their motivation, but rather the result of a simple automatic assumption that good things are more likely to happen to them than bad. The automatic and pervasive tendency to be optimistic about the future appears to reveal something fundamental about the human psyche. Across events, situations, and people, there is a tendency to assume that positive events will occur and negative events will not occur. The automaticity of this belief helps to explain why optimism appears to be nearly ubiquitous in humans and extremely difficult to reduce or eliminate (Taylor & Brown, 1988; Weinstein & Klein, 1995).

An obvious question that arises is: why would people make consistently biased judgments? The ability to plan and anticipate future events is a hallmark feature of human consciousness and one of the things that appears to differentiate humans from many other animals. Many of the actions people take in the present are determined by their judgments about what is likely to occur in the future. An umbrella is brought in anticipation of rain; seatbelts are buckled in anticipation of a ticket or accidents; dating partners are pursued based on anticipation of pleasurable encounters. Given the importance of judgments about the future to daily life, why would people have a pervasive tendency to make biased judgments about the future?

Automatic optimism is likely the result of basic evaluations that differentiate outcomes that can help or harm the individual. Even plants and single-celled organisms approach stimuli that convey advantages (such as sunlight) and avoid stimuli that convey disadvantages (such as toxins). Damasio and colleagues have suggested that information about the advantageousness of different stimuli is conveyed in humans by affective reactions (e.g., Bechara et al., 1997; Damasio, 2003). When individuals encounter something potentially advantageous they have a positive affective reaction and when they encounter something potentially disadvantageous they have a negative affective reaction. These basic affective reactions allow people

to efficiently navigate their environment and decide what to approach and what to avoid. When thinking about the future, however, people are likely to conjure images of potential future events and they can have affective reactions to these representations of future events (e.g., Slovic et al., 2000). Considering a possible wedding, for example, may bring to mind images of dresses and family and affective reactions to these images can result in biased likelihood judgments. In other words, people can approach or avoid events by proxy before they have occurred by judging that they are or are not likely to occur in the future. This tendency can result in misfortune because the event has not yet occurred. An individual who has a negative reaction to an image of a car accident and thus assumes that accidents are unlikely may believe that seatbelt use is unnecessary and thus increase the chances of injury or death.

Experiential processing can be more adaptive than engaging in relatively deliberate and cognitively demanding analytic processing for every decision. Experiential reactions allow people to make snap judgments without wasting resources, and in many instances those snap judgments are identical to judgments people make after more careful deliberation (e.g., Ambady & Rosenthal, 1993). In some situations, however, experiential processing can result in judgments that are systematically biased or even harmful (Gigerenzer, 1996). Similarly, there is evidence that optimism about the future can allow people to carry on despite, at times, overwhelmingly negative events (see Taylor & Brown, 1988, for a review). In addition, people who have a general tendency to be optimistic have a greater sense of self-efficacy and better health and overall well-being (Armor & Taylor, 1996). Optimism about specific events, however, can be maladaptive when evidence is ignored in favor of optimistic beliefs (Colvin & Block, 1994; Janoff-Bulman & Frieze, 1983; Perloff, 1983; Tennen & Affleck, 1987). The gambler who continues to play the tables long after rational analysis would have encouraged a stop or the teenager who drives too fast despite evident danger are potential examples of how automatic optimism can lead people to behave in ways that are inconsistent with their better judgment (Denes-Raj & Epstein, 1994) and perhaps also to rationalize their irrational behaviors (Kunda, 1990).

Multiple interventions have attempted to reduce optimistic desirability biases and encourage more realistic judgments across a number of domains and have typically failed (Dunning, Heath, & Suls, 2004; Weinstein & Klein, 1995). Desirability biases that result from automatic optimism are unlikely to be influenced by the presentation of statistics or rational information because it is not based in rational analysis. Reduction of optimism may require interventions that target experiential processing, but it is not clear how best to

intervene in experiential processing. Some theorists have suggested that it may be possible to train the experiential system to make the desired judgment through repeated exposure (Goldstein & Gigerenzer, 2002; Hogarth, 2001). Review of the circumstances under which people are optimistic versus more realistic or even pessimistic may also reveal ways to exploit the functioning of the experiential system to encourage analytic processing (Lench et al., 2008).

## **Implications of Differences in How We Judge Ourselves and Other People**

In our studies, participants made optimistically biased judgments for another person as well as for the self, but they interpreted ambiguous probabilistic information more optimistically for themselves than for another person. Participants interpreted ambiguous probabilities to indicate that positive outcomes were likely and negative outcomes were unlikely in their own futures. However, they did not extend this optimistic interpretation of the probabilities when judging the future of another person. Potential future events are likely to evoke stronger emotional reactions when the event may occur in one's own future rather than the future of an unknown other. These affective reactions are likely to be experienced as subjectively compelling and lead people to make biased judgments for themselves and more realistic judgments for others (Valdesolo & DeSteno, 2007). For example, an individual that mocks his friend for purchasing lottery tickets due to the low probability of winning may then purchase tickets for himself and daydream of the boat he will buy with the winnings.

We presented evidence that people give themselves the benefit of the doubt in situations where they do not extend the same benefit to others. The tendency to attend to desires when judging one's own future but probabilities when judging the futures of others may lead to some forms of hypocrisy and explain some of the asymmetries in judgments for the self versus other people. People may be able to easily recognize the logical and rational course of action that another person should pursue because they rely on rational information to make their judgment. Yet they may fail to realize that, were they in the same situation, they would have difficulty recognizing the rational action and would instead rely on compelling emotional reactions that may result in less than optimal decisions. Therefore self-other asymmetries in judgments may arise, not only as the result of cognitive biases in how people consider information

for the self and others (Hoorens, 1995), but due to differences in emotional responses to possible events for the self and others.

## **The Future of the Desirability Bias**

There is still much to discover about the desirability bias and its impact on judgment and we discuss a few of these potential future directions. Multiple factors may interact with the tendency to be automatically optimistic to predict people's judgments about the likelihood of future events. Other emotional and cognitive processes, preexisting knowledge or experience, or individual differences may mitigate or enhance the tendency created by automatic optimism to believe that positive events will occur and negative events will not occur. For example, strong negative emotions such as fear have an independent impact on judgments about the likelihood of future events. People who are dreading an upcoming event, people who are feeling completely unrelated fear, and people who are generally anxious all tend to judge that negative events are relatively more likely to occur and positive events are less likely to occur (Butler & Mathews, 1987; Lerner & Keltner, 2001; Loewenstein, Weber, Hsee, & Welch, 2001). These more intense emotional factors are likely to interact with immediate affective reactions to potential events in complex ways.

The impact of complex affective reactions to potential future events is also unclear. An upcoming job interview, for example, may elicit positive affective reactions due to the prospects for advancement in the job and negative affective reactions due to the doldrums of the daily tasks involved in the job. Presumably both of these affective reactions could influence judgments about the likelihood of future events, but the precise manner in which they might combine is unclear. One possibility is that they could combine into one overall evaluative reaction. Much like with an attitude, where the evaluative reaction toward an object is greater than the sum of reactions toward individual cognitions about the object, affective reactions about future events may sum over multiple reactions. If this is the case, they should be, like attitudes, resistant to change even if individual reactions change and it would be difficult to effectively alter people's optimistic tendencies. Another possibility is that they are additive but separable. If this is the case, then, for example, a strong positive reaction and a weak negative reaction would result in a weak positive reaction and the overall affective reaction should change based on what thoughts and reactions are brought to mind at any given moment and should be

changeable. These relationships have implications for improving the length and quality of people's lives.

It is also unclear how a connection to the other person might impact judgments. People who like or identify with another person may extend to the other person the same benefits that they give to themselves. In such a case, people would be equally optimistic for a close other as for themselves. There is some evidence that this might be the case. People tend to make optimistic judgments for their best friends and close others (e.g., Burger & Burns, 1988; Harris & Middleton, 1994; Klar, Medding, Sarel, 1996). In addition, parents were optimistic about the futures of their children and the intensity of their optimism was predicted by how attached they felt to the child (Lench, Quas, & Edelstein, 2006). In some situations, therefore, people may extend optimism to others and investigation of when people extend optimism to others is likely to reveal information about why people are optimistic in general.

## SUMMARY

People generally believe that they will experience positive events in the future and will not experience negative events. It is not that all of us believe that we will become millionaires and are invincible. Rather, we simply assume that all of life's little events will work out in our favor. We recognize the limits of other people, and, like any Monday quarterback, are able to recommend rational judgments for others. When it comes to our own futures, however, we tend to ignore rational information in favor of the belief that the future will be consistent with our desires. We thus all live under the personal myth that we will ultimately be healthy, wealthy, and wise.

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