616.895.4-085:[004.773.7:061.1 ЕИ


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OPTIMI (ONLINE PREDICATIVE TOOLS FOR INTERVENTION IN MENTAL ILLNESS) EU FUNDED E-HEALTH PROJECT AIMED AT ESTABLISHING PREDICTORS FOR POOR COPING BEHAVIOR

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Summary. This article gives an overview on OPTIMI´s theoretical background with an emphasis on the concept of "high risk" for stress-related disorders such as depression and coping strategies. The article shows the widely accepted relationship between stress and the onset of depression and emphasizes how individual reactions to stressors depend to a large extent on their problem-oriented or emotion-oriented coping strategies.

Key words: Depression, stress, high risk, coping.

Depression and stress-related disorders are among the most common mental illnesses and the prevention of depression and suicide is one of the central focus points in the European Pact for Mental Health and Well Being yet, currently, very little research is devoted to develop effective systems for early Detection and Prevention of the onset of mental illness. Against this background the goal of OPTIMI is to develop tools to perform Prediction through early identification of the onset of an illness, especially those being stress-related, by monitoring mood states, coping behavior and changes in stress-related physiological variables (e.g. heart rate, cortisol, sleep, etc.). OPTIMI is based on the hypothesis that the central issue and starting point of longer term mental illness depends on the individual's capacity and ability to cope with stress both on a psychological and a physiological level.

Three initial studies ("calibration trials") have been performed in Switzerland, Spain and China. These trials used high-risk populations for mental distress (students undergoing exams, people facing economic difficulties, mothers of handicapped children) to test and establish the different sensor and measurement systems.

Stress and its relationship to depression

"Stress" has become an everyday expression with many different connotations frequently used by laypersons and specialists as well. Therefore it is necessary to have a closer look at scientific approaches and models, which tried to define and explain the phenomenon.

The first physiologically oriented approach was pursued by Cannon [1] who investigated the physiology of emotion and wrote "… stress (is) a **disturbance of homeostasis** under conditions of cold, lack of oxygen, low blood sugar, and so on..." [2].

Selye [3] described stress as "…**bodily defences against any form of noxious stimuli** (including psychological threats)…" and in his theory of stress described it as a **psycho-biological adaptation process**. This reaction-oriented approach was later abandoned due to the fact that not only agonistic but also antagonistic stimuli can provoke similar physiological arousal or reaction patterns. The stimulus oriented approach considered critical life events (e.g. death of a beloved person, chronic illness, divorce, disability, loss of workplace, and so on) as major stressors, but was unable to explain that people may display very different types of reaction to the same external critical life event.

The **transactional model of stress**, from the Berkeley research group of Richard Lazarus, introduced the idea that an individual's cognitive processing of stressors matters most - instead of the characteristics of the situation or the characteristics of the impending stimulus. **Stress is seen as a dynamic relationship between a person and its environment**. The subjective representation of an event can be evaluated as challenging, defiant, harmful or threatening - Lazarus called this evaluation the "primary appraisal" —which might or Introduction

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OPTIMI´s approach explicitly is inspired and guided by this transactional model, as it offers the most comprehensive framework for its strategy.

Physiological manifestations of stress

Stressful environmental influences can cause **permanent physiological changes**. In his adaptation model, Selye [3] postulated three phases: 1. In an acute alert situation all bodily resources are activated and unnecessary body functions are lowered or turned off - heart rate and breathing frequency increase and attention is solely focused on the stressor. 2. Increased resistance towards the stressor develops (for example in case of loud noise as the stressor the threshold for acoustic perception is increased), leading to a greater demand for energy. If this state persists for an extended period of time, energy resources may exhaust. 3. The process of exhaustion may cause irreversible physiological changes. These changes are intended by nature to create the physiological pre-requirements against the stressor, as a form of "biological" coping. Sapolsky [4] was able to demonstrate brain "lesions" after permanent uncontrollable emotional stress.

The way stress is perceived may vary largely inter-individually. Byrne introduced the **"repression-sensitization"-model** in 1961, suggestion that individuals may lie anywhere between these two extremes of perceiving/ dealing with stress. Repressors are defined as subjects that neglect/ suppress frightening information. Repressors will experience less manifest anxiety in a threatening situation than sensitizers. On the other hand, sensitizers explicitly focus their attention on threatening information. Weinberg [5] was able to show that repressors reported to be subjectively less stressed in an experiment, but did react more intense on a physiological level than sensitizers. They asked women to suppress their emotions while watching emotional films. In the suppression condition of this trial, participants showed heightened reactions of their sympathetic nervous system and cardiovascular activity. Other correlates of "repression" (Miller called it "monitoring vs. blunting", 1987) are reported in a review by Schwartz [6], e.g. increased physiological activity, decreased immune functioning, a heightened vulnerability for allergies, hypertension, impotence etc.

Psychological impact of stress

As said before, a widely used **definition of stressful situations is one in which the demands of the situation threaten to exceed the resources of the individual** [2]. It is clear that all of us are exposed frequently to stressful situations at the societal, community, and interpersonal level. The way we meet these challenges will influence our health status. Acute stress responses in young, healthy individuals may be adaptive and typically do not

impose a health burden. Indeed, individuals who are optimistic and have good coping responses may benefit from such experiences and do well dealing with chronic stressors [7]. **By contrast, if stressors are too strong and too persistent in individuals who are biologically vulnerable because of age, genetic, or constitutional factors, stressors may lead to manifest disease.** This is particularly the case if the person has few psychosocial resources and only poor coping skills [6].

It is well know that **stress, in moderate doses, is necessary**, even beneficial in our life. Just a quick revision of its possible positive effects: stress as a level of stimulation, a thrill, a challenge; a source of energy; it can enhance our perception, attention and make us more productive; it renders us better prepared for future difficulties, solving problems and learning skills; and as a warning sign of danger, its more biological function. Moreover, response to stress may be beneficial not only as a short-term adaptation to a specific stress but also may supply a long term benefit. In that way, an organism already subject to stress may be more able to cope with another encountered stress. This effect is widely known in the literature as the acclimatization phenomenon [8]. Summarizing, stress can promote the personal development if it is limited to a given challenge which is successfully dealt with by the individual.

On the other hand, the **adverse effects of stress have been investigated widely**. The negative effects of chronic stressors are particularly common in humans, possibly because their high capacity for symbolic thought may elicit persistent stress responses to a broad range of life events [6]. The harmful effects of stress can be ascribed to the nature of the stressful events, to the individual or to the interaction of both, but in the long run a harmful effect on an individual's stability is exerted.

What can be considered as a **psychological stressor**? Any event that forces a person to change or adapt. For example, catastrophic events (e.g. natural disasters); life changes and strains (divorce); chronic stressors (living near a noisy airport) and daily hassles (commuting in heavy traffic). The response to this stressor can be physical and/ or psychological. The **psychological level** can be distinguished in **emotional, cognitive and behavioural responses**. Usually, individuals respond on more than one psychological level [2].

Furthermore, between the stressor and the response to stress, other processes, unavoidably have to take place to understand the general mechanisms of stress. Thus, **the relationship between psychosocial stressors and its consequences is very complex** [6]. It is affected, for example, by the nature, number, and severity or intensity and persistence of the stressors as well as by the individual's biological vulnerability, learned patterns of coping and the "perceived stress" [9] including variables like predictability and control over the stressor. On one hand, predictable stressors tend to have less impact than unpredictable stressors, especially when stressors are intense and occur for relatively short periods of time. On the other hand, the perception of being in control (or not) mediates the effects of stressors. The belief that a stressor is controllable can reduce the impact of the stressor. Besides, life event dimensions of loss, humiliation, and danger are related to the development of major depression and generalized anxiety [10].

Two other variables that could be significant in this process are **social support** [11], and **resilience** [12]. We consider these variables as "**buffering**" **or protective factors against stressful events.** Dumont and Provost [13] found that resilient adolescents had higher self-esteem and well-adjustment and showed higher scores on problem solving than vulnerable subjects. They conclude that the beneficial role of certain internal factors (self-esteem, coping) and external factors (social support and social activities) constitutes in protecting young people against becoming depressed and help to cope with daily hassles.

Researchers, most notably Rutter [14], have cited important processes associated with resilience necessary for those who work and live with high-risk young people to recognize and deal with: a) the reduction of risk and its negative chain reaction, b) provide opportunities to enhance self-esteem and c) recognize turning points for a change in a trajectory.

Therefore, recent stress research leads us to conceptualize the stress process in terms of external challenges and perceptions of the challenges, coping resources and perceptions of coping resources, and the dynamic interplay of these over time [9].

Impact of stress on health

There is overwhelming evidence about the consequences of the most frequent kind of stressors: exposure to violence, abuse and divorce/ marital conflict [15]. The psychological effects of maltreatment/abuse include the dysregulation of affect, provocative behaviours, the avoidance of intimacy, and disturbances in attachment. Sexual abuse leads to major psychological disturbances including personality disorders and is linked with negative thoughts towards learning and poor school performance. Children of divorced parents show more antisocial behaviour, anxiety and depression than their peers [16].

Most emotional disorders are related to stress [17]; they either are caused by stress and/or cause it or both. Interpersonal problems can be a cause or an effect of stress: feeling pressured or trapped, irritability, fear of intimacy, sexual problems, feeling lonely, struggling for control, and others. Likewise, stressful life events can exacerbate many "bad" habits: procrastination and much "wasted time" are attempts to handle anxiety. Moreover, several unpleasant emotional feelings generate feelings of inadequacy, depression, anger, dependency. Preoccupation with real or often exaggerated troubles/worries, concerns about physical health, obsessions, compulsions, jealousy, suspiciousness, fears, tiredness, and phobias are common as well.

Other consequences of stress that have major

negative impact on health have been identified, such as increases in smoking, substance and alcohol use, sleep problems, and eating disorders [6]. Life in stressful environments has also been linked to fatal accidents [18].

Summarizing, exposure to intense and chronic stress has long-lasting effects on a neurobiological (for overview see: [19]) and on a psychological level [6].

Stress and depression

Research of the last 50 years has demonstrated convincingly that there is a robust and causal association between **stressful life events and the occurrence of major depression** (e.g. [20]). Studies suggest that most episodes of major depression are preceded by stressful life events, although most people do not become depressed even if they experience a negative life event, thus suggesting that besides stressful life-events as triggers for depression a genetically based vulnerability interacts with these events [21].

Regarding the relationship of the physiological changes due to/ under stress and depression present research concentrated on the role of the hormone **cortisol** which is secreted by the **HPA (hypothalamo-pituitary-adrenal) -axis.** A longitudinal study by Harris et al. [22] examined morning and evening cortisol levels and onset of depressive episodes following severe stressors or ongoing difficulties among women considered to be at high or low risk for depression (expressed as the amount of negativity in their primary relationships or to low self-esteem). Higher morning (but not evening) cortisol levels, life events, and vulnerability status all predicted depression onset. Goodyer et al. (2000) found similar results in adolescent depressives. The authors speculate that high cortisol levels might render the brain more susceptible to develop depression under duress, but the specific mechanisms are not yet known.

According to Holsboer [23, 24] changes in the setpoint of the HPA-system in the majority of depressed patients result in an altered regulation of corticotropin (ACTH) and cortisol secretory activity. More sophisticated analysis has indicated that corticosteroid receptor signalling is impaired in major depression, resulting among other changes, in increased production and secretion of corticotropin-releasing hormone (CRH) in various brain regions postulated to be involved in the causality of depression. In biological psychiatry, drugs acting as antagonists at the corticosteroid receptor are discussed as potential novel antidepressants. A recent study [25] gave evidence for the fact that for example extreme early childhood stress (childhood abuse) may lead to altered brain structures (in hippocampal areas) and altered glucocorticoid receptor function, thus paving the way for an increased susceptibility to react with depression to increased levels of cortisol caused by stressful life events. Lupien et al. [26] have recently summarized the knowledge about stress throughout the lifespan on brain, behaviour and cognition, assuming basically that the hypothalamo-pituitary-adrenal axis (HPA) by producing glucocorticoids exerts potentially long-lasting effects on the functioning of brain regions regulating their release. This is due to the fact that steroid receptors are expressed throughout the whole brain and act as transcription factors and thus also regulate gene expression.

Cortisol secretion is thus a major parameter reflecting both stress and depression and vice versa "feeding back" on mood regulation and therefore is among OPTIMI´s central variables.

As said before, it is well known that **first depressive episodes often develop following the occurrence of a major negative life event, which is assumed to be causal for the onset of depression** [20]. The diagnosis of a major medical illness can also be considered a severe life stressor and often is accompanied by high rates of depression. Stressful life events also precede anxiety disorders. Interestingly, long-term follow-up studies have shown that anxiety occurs usually before depression. In fact, in prospective studies, patients with anxiety are most likely to develop major depression after stressful life events occur [6]. Likewise, stress/ stressful life events can precipitate a number of psychiatric disorders including conversion disorder, adjustment disorder, acute stress reaction, and post- traumatic stress disorder, generalized anxiety disorder and somatization disorder as well.

Sleep regulation in stress and depression

Sleep-wake regulation and stress/ depression

Insomnia (i.e. problems to fall asleep or to maintain sleep or non-restorative sleep) is independently associated with psychopathological conditions, most notably depressive disorders (e.g. [27, 28]). An overview of longitudinal epidemiological studies investigating the association between insomnia and depression is given in figure 1 (data taken from Baglioni et al., in press) [29].

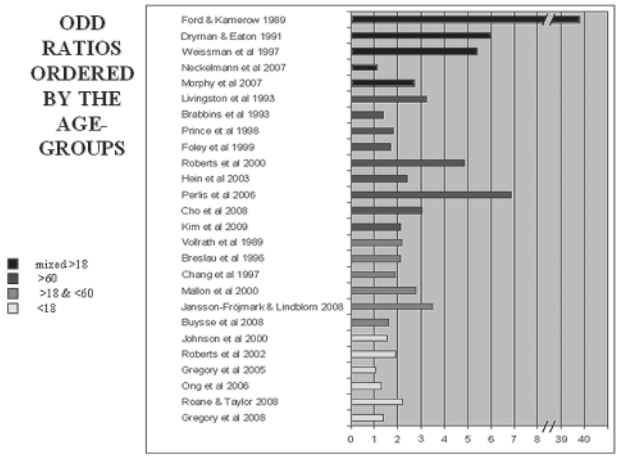

Figure 1. Results from epidemiological studies simultaneously investigating insomniac and depressive symptoms

In this figure, odds ratios for depression at follow-up (usually 1 to 3 years after baseline measurement) are presented for those patients having insomnia at baseline in comparison to patients with no insomnia at baseline. It can be seen that most of

the studies described significantly increased odds ratios indicating that subjects with insomnia are on average 2.5 times more likely to develop depression one or several years later than subjects without insomnia. This overwhelming evidence clearly indicates that insomnia is a predictor for depression. Following this line of reasoning, Ford and Kamerow suggested in 1989 that 'treatment of insomnia may prevent psychiatric consequences' [30]. However, this assumption has not yet been put to test empirically and needs to be addressed in large-scale longitudinal investigations. This seems mandatory and very important for public health, as a recent longitudinal study demonstrated that disturbances of sleep onset/ maintenance are associated with an increased risk for suicidal ideation/ behaviour even in the absence of other psychopathology [31].

Depressed patients frequently suffer from disturbances of sleep continuity including an increased latency to fall asleep, an increased frequency of nocturnal awakenings and early morning awakenings. Furthermore, specific sleep architecture alterations are evident in depression, namely a reduction of slow wave sleep, a shortened REM latency and an increased REM density [32]. Insomnia patients usually do not have these REM sleep alterations supporting the assumption that insomnia is an independent disorder and not merely an early symptom of depression.

Given the high prevalence and economic burden of depression, it is of significant importance to investigate the role of insomnia for psychopathology more extensively. A biological link between insomnia and depression might be increased cortisol secretion, which is present in both depressive disorder (for overview: [23]) and at least in some patients with Primary Insomnia (overview see [33]).

Stress and coping

Overview

Coping is defined in various ways: **"any response to external life strains that serves to prevent, avoid or control emotional distress"** [34] or as "constantly changing cognitive and behavioral efforts to manage specific external or internal demands that are appraised as taxing the resources of the person" [2].

Coping strategies refer to the specific efforts, both behavioural and psychological, that people employ to master, tolerate, reduce, or minimize stressful events. Two general coping strategies have been distinguished:

1. Approach and task-oriented coping: these coping styles involve problem-solving, seeking information and attempts to alter the situation. Thus, these strategies are efforts to do something active to alleviate stressful circumstances. Tamres et al., [35] include in their meta-analysis three individual behaviours: active coping, planning, and seeking social support (instrumental) and another general category: problem-focused coping.

2. Avoidance and emotion-oriented coping styles involve efforts to regulate the emotional consequences of stressful or potentially stressful events. Avoidance-coping describes activities that aim at avoiding the stressful situation and involve denial, wishful thinking, and withdrawal. Emotion-oriented coping describes emotional reactions that are self-oriented to reduce stress. These reactions involve emotional responses (individuals blaming themselves for being too emotional, becoming angry, or tense) and ruminative responses [36].

Research indicates that people use both types of strategies to combat most stressful events [37]. The predominance of one type of strategy is determined, in part, by personal style (e.g., some people cope more actively than others) and also by the type of stressful event; Problem-focused coping is commonly employed to deal with potential controllable problems such as work-related problems and family-related problems, whereas stressors perceived as less controllable, such as certain kinds of physical health problems, prompt more emotion-focused coping. This different strategy, depending on controllability of stressor, is proposed to be most adaptive, and is also known as the goodness-of-fit approach [38]. The emotion-coping style seems to be associated with higher psychological distress [39] and predictive of higher levels of psychopathology and functional impairment [40]. In a recent study, Vinberg et al., [41] found that use of emotion-oriented coping was more prominent in the high-risk affective disorder group compared with the low-risk group, also after adjustment for sociodemographic characteristics and the experience of stressful life events.

Coping researchers distinguish between stress reactions, which describe immediate involuntary physiological, psychological, and behavioural responses to stressful situations [42], and action regulation [43] which refers to "how people mobilize, guide, manage, energize, and direct behaviour, emotion, and orientation, or how they fail to do so" under stress [44]. Although there is an ongoing debate about how stress reactions and action regulation are related, it is now a general consensus that they mutually influence each other [45]. Manifest coping responses reflect the balance (or, more precisely, the imbalance) between reactions and regulation, with involuntary stress responses being perceived as the result of extreme stress reactions combined with weak or disabled regulatory systems, and volitional coping responses being seen as the result of weak stress reactions or well-developed action regulation systems [46].

Psychological Coping models

Coping is a very broad concept with a long and complex history [42, 47]. As said before, a common model of coping set forth by Lazarus and Folkman [2] in their **Transactional Model of Stress Appraisal and Coping** delineates that coping choices are dependent on both the appraisal of the threat (**primary appraisal**) and the appraisal of one's resources to address the threat (**secondary appraisal**). Finally, the reappraisal is defined as a successive evaluation that is based on new information obtained from the environment and/or person during the circumstance. Primary appraisal evaluates perceived control of the

situation and resources available to the individual. Secondary appraisal guides the use of specific coping strategies. The effectiveness of these coping strategies determines the reappraisal, as well as the individual's psychological adjustment. Thus the nature of coping is conceptualized as dynamic in nature, as a transaction between the threat, the appraisal and the response.

Furthermore, several distinctions have been made with respect to coping styles [45]:

Problem vs emotion-focus

Lazarus and Folkman [2] distinguish between **problem-focused and emotion-focused coping**. The first one is directed at the stressor itself in order to remove, evade or diminish its impact. If the stressor cannot be evaded, this mechanism includes active coping, planning, seek social support (instrumental) and problem-focused coping [35]. The second strategy is aimed at minimizing stress triggered by stressors, including a wide range of responses, ranging from self-soothing (relaxation, seeking emotional support, etc., to expression of negative emotion (yelling, crying, etc.), to a focus on negative thoughts (rumination, etc.), to attempt to escape stressful situations (avoidance, denial, wishful thinking, etc.) [48]. This distinction can, however, be problematic, because some behaviours can serve either function, depending on the goal motivating their use. For example, if it is the aim of seeking support to obtain emotional support and reassurance it is classified as emotion-focused, but if the aim is to obtain advice or help, then it must be considered problem-focused. Perhaps it is more useful to interpret the two forms of strategies "problem vs. emotion-focussed" as complementary rather than two different coping categories [2].

Engagement vs disengagement

Engagement coping can be defined as a coping aimed at dealing with the stressor or the resulting distress emotions and includes problem-focused coping and some forms of emotion-focused coping: support seeking, emotion regulation, acceptance, and cognitive restructuring Disengagement coping can be understood as a coping mechanism aimed at escaping from dealing with the stressor or the resulting distressing emotions and includes responses such as avoidance, denial, and wishful thinking. **Disengagement coping** is often emotion-focused, because it involves an attempt to escape feelings of distress. Sometimes disengagement coping is almost literally an effort to act as though the stressor does not exist. Wishful thinking and fantasy distance the person from the stressor, at least temporarily, and denial creates a boundary between reality and the person's experience. Despite the aim of avoiding distress, disengagement coping is usually ineffective over the long term, can promote a paradoxical increase in intrusive thoughts about the stressor and increase negative mood and anxiety, just as the increased intake of alcohol and drugs, shopping or gambling, may create serious problems on their own [48].

Accommodative coping and meaning-focused coping

Accommodative coping does not exert control or is secondary to other coping efforts. It summarizes responses such as acceptance, cognitive restructuring and scaling back one's goals in the face of insurmountable interference. Self-distraction can be included here. **Meaning-focused coping** named after Folkman [49] reflects a strategy in which people draw on their beliefs and values to find, or remind themselves of, benefits from the stressful experiences [50]. This way of coping includes reordering life priorities and infusing ordinary events with positive meaning, and also involves reappraisal and appears to be most likely when stressful experiences are judged to be uncontrollable.

Proactive coping

Although most discussions of coping emphasize responses to threat and harm, Aspinwall and Taylor have pointed out that some coping occurs proactively before the occurrence of any stressor. Proactive coping is not necessarily different in nature from other types of coping, but it is intended to prevent threatening or harmful situations even to arise. Proactive coping is nearly always problem-focused, involving the accumulation of resources that will be useful if a threat arises and scanning the experiential horizon for signs that a threat may arise. If the beginning of a threat is perceived, the person can engage strategies that will prevent the threat from increasing. If the anticipation of an emerging threat helps the person avoid it, the person will experience fewer stressful episodes and will experience stress of less intensity when the experiences are unavoidable [48].

After this brief review, it seems clear that there are many ways of coping, but none of the distinctions made above fully represents the comprehensive structure of coping. Confirmatory analysis clearly supports hierarchical, multidimensional models of coping [43] as depicted in figure 2 (Adapted from [45]).

In this model, coping is conceptualized by considering the multiple individual processes that give rise to it, as well as the environmental contexts within which it unfolds. Families, peer groups, and schools create demands and act as filters for stressors and resources, forming the backup systems that will protect children (or leave them vulnerable) while their coping capacities are developing. Skinner and colleagues (Coping Consortium, 1998) have further developed three nested levels and timescales based on this model:

Coping as an Episodic Process: coping is organized into episodes that unfold over time. Coping is recruited in response to demands (environmental or intrapsychic) and is shaped by an individual's appraisals of those demands and the social and individual resources available in the situation. Depending on how encounters evolve, different outcomes result, and these feed-back into subsequent demands and resources. The effects of episodes can accumulate, creating short-term coping resources and liabilities.

Coping as an Adaptive Process: coping can be seen as part of the adaptive processes through which adversity has long-term effects on development. The consequences of coping are not limited to the resolution of stressful episodes, but accrue in the functioning, health, and survival of individuals, relationships, and groups. This implies that ways of coping are not simply lists of things people do in times of distress. Their taxonomy should reflect basic adaptive processes and help differentiate the effects of stress on functioning and adaptation. At this level, the study of coping can contribute to an understanding of how adversity shapes the development, fitting within the frameworks of risk, resilience, and competence.

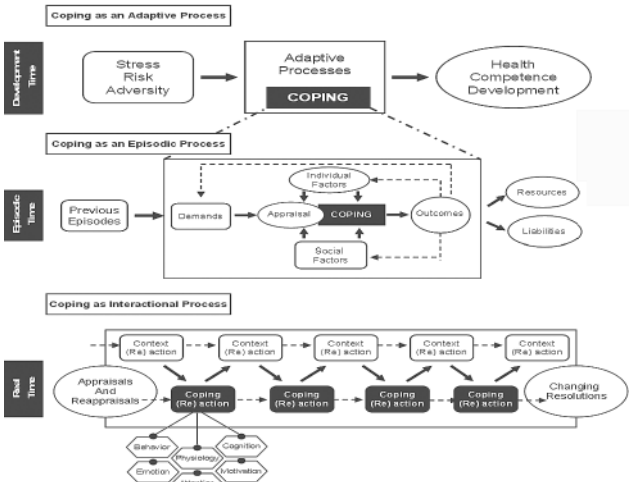

Figure 2. A model of Coping as a Multi-level Adaptive System. (Adapted from Skinner and Zimmer-Gembeck, 2009 [45])

Coping as an Interactional Process: coping interactions can also be viewed as real-time, reciprocal exchanges between person and context. As interactions unfold, individuals form and revise appraisals; at the same time, progress may be made toward alternative resolutions of the interaction. In such a transactional process, multiple components of reactions to stress are evoked and coordinated in real time. In this sense, coping is an organizational construct, capturing the interactions among behavior, emotion, attention, cognition, and motivation under stress and building on what is known about general stress physiology and temperament.

An overview of this model is given in table 1 (see below).

According to Skinner et al. [45], we think that a multilevel system in the study of coping can provide for OPTIMI an integrative perspective in the real-time coping interactions, in which individual's response to stress is constrained by of cognitive, social, emotional and motivational processes. With this knowledge we may develop additional strategies to detect and modify coping with concomitant mental and physical health benefits.

Coping and Depression: what is known?

It has long been known that people with a diverse array of mental disorders, including depression, schizophrenia, anxiety disorders, and autism, lack coping resources for managing the challenges of daily living. Likewise, chronic psychological distress, which is related to lack of coping resources is implicated in more than half of the DSM-IV axis I disorders and in almost all of the axis II psychiatric disorders. For example, depression is marked by pessimism, low self-esteem, a low sense of control, and adverse effects on social relationships.

Social support, another significant coping resource, is defined as the perception or experience that one is loved and cared for by others, esteemed and valued, and part of a social network of mutual assistance and obligations. Research consistently demonstrated that social support reduces psychological distress, such as depression or anxiety, during times of stress and promotes psychological adjustment to a broad array of chronically stressful conditions.

In addition to their role as mediators, coping processes also can interact with contextual and individual parameters in their contribution to adjustment. For example, cancer patients who experienced low social support in tandem with the greater use of avoidant coping, subsequently evidenced more severe symptoms of posttraumatic stress [7]. Emotionally expressive coping predicted decreased distress and fewer medical appointments for cancer-related morbidities in breast cancer patients high in hope. Newer models for conceptualizing the links among stressful life experiences, coping processes, and mental health outcomes also recognize their potentially reciprocal relations. Hammen's [50] stress generation hypothesis points to the potential for the experience of depression to encounter stressful events, which in turn can exacerbate depressive symptoms. Holahan et al. [20] recently integrated coping processes into the stress generation model. In a 10 yr long investigation of 1211 adults aged 55 to 65 years at study entry, avoidance-oriented coping at study entry predicted more chronic and acute life stressors four years later, which in turn predicted an increase in depressive symptoms at 10 years.

Reid et al [25] suggest that the internalising disorders such as depression are likely to result from an inability to down-regulate negative emotions and/or up regulate positive emotions, yet capturing and demonstrating this phenomenon has proven difficult.

In a recent and exhaustive work of coping and personality, Carver and Connor-Smith [51] examined the five-factor model of personality related to coping and pointed out that the second factor, neuroticism concerns the ease and frequency with which a person becomes upset and distressed. They also point out that moodiness, anxiety and depression reflect higher neuroticism which has been linked to the avoidance temperament. In the same publication meta-analyses show that neuroticism predicts clinical symptoms and mental disorders, with a stronger relationship to mood and anxiety disorders than to externalizing problems Neuroticism is also linked to greater risk for suicidal ideation, attempts, and completion and to more alcohol use. Pessimism

Table 1

A Hierarchical Model of Adaptive Processes and Families of Coping (Adapted from Skinner and Zimmer-Gembeck, 2009 [45])

Adaptive process 1: Coordinate actions and contingencies in the environment				
Family of coping:	1. Problem solving	2. Information seeking	3. Helplessness	3. Escape
Family function in adaptive process:	Adjust actions to be effective	Find additional contingencies	Find limits of actions	Escape noncontingent environments
Ways of coping:	Strategizing Instrumental action Planning Mastery	Reading Observation Asking others	Confusion Cognitive interference Cognitive exhaustion Passivity	Behavioral avoidance Mental withdrawal Flight Denial Wishful thinking
Adaptive process 2: Coordinate reliance and social resources available				
Family of coping:	5. Self-reliance	6. Support seeking	7. Delegation	8. Social Isolation
Family function in adaptive process:	Protect avaiable social resources	Use available social resourses	Find limits of resources	Withdrawal from unsupportive contexts
Ways of coping:	Emotion regulation Behavior regulation Emotional expression Emotion approach	Contacit seeking Comfort seeking Instrumental aid Social referencing	Maladaptive help seeking Complaining Whining Self-pity	Social withdrawal Concealment Avoiding others Freeze
Adaptive process 3: Coordinate preferences and available options				
Family of coping:	9. Accomodation	10. Negotiation	11. Submission	12. Opposition
Family function in adaptive process:	Flexibility adjust preferences to options	Find out new options	Give up preferences	Remove constraints
Ways of coping:	Distraction Cognitive restructuring Minimization Acceptance	Bargaining Persuasion Priority seeking	Rumination Rigid perseveration Intrusive thoughts	Other blame Projection Aggression Defiance

is similarly related to lower levels of subjective well-being across many studies.

As reflected above, Vinberg et al., [41] concluded that healthy individuals with a family history of affective disorder use maladaptive coping styles more often than individuals without a family history of affective disorder, but the association interacts with other factors: Stressful Life Events, personality traits, and subclinical depressive symptoms. Hence, the use of maladaptive coping style may represent a trait marker for mood disorder in individuals at risk for affective disorder. Consequently, improving maladaptive coping styles may be a target for selective prevention focusing on subgroups at high risk of developing an affective disorder.

Physiological correlates of successful/ unsuccessful coping

Undoubtedly mood states are reflected by or sometimes even driven by changes in physiological variables, like for example cortisol secretion. The question here is how and to what extent the process of coping (successful vs. non-successful) with a stressful event is reflected by physiological parameters like sleep, cortisol, EEG, ECG or results of voice analysis. A major caveat of this issue is to avoid circular reasoning. As said before, it is assumed that poor coping in relation to stressors is coupled with an increased risk becoming depressed. On the other hand, physiological stress responses may occur independently of coping style, i.e. changes in heart rate, EEG, cortisol and sleep may happen uniformly in subjects undergoing for example exams irrespective whether they are coping well or not. It is hypothesized that it is not the acute physiological stress response but probably the time course of the physiological stress response over time and the way physiological systems regulate themselves homeostatically. In other words, an increase in cortisol secretion provoked by a sudden stressor maybe either followed by a down-regulation of cortisol levels to normal levels or by a constantly enhanced cortisol regulation, in the latter case being indicative of a pathological process.

OPTIMI with its frequent measurements of mood/ anxiety etc. and stressors/ coping capabilities and physiological variables allowed having a closer look at the interrelationships between stressors, coping mechanisms, mood states and physiological reactions. Therefore OPTIMI will offer the chance to discover the exact relationships between types of coping and type of physiological reactivity.

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OPTIMI (ПРЕДИКАТИВНІ ІНСТРУМЕНТИ В РЕЖИМІ ONLINE ДЛЯ ВПЛИВУ НА ПСИХІЧНЕ ЗДОРОВ`Я) ПРОЕКТ «ЕЛЕКТРОННЕ ЗДОРОВ`Я», ЩО ФІНАНСУЄТЬСЯ ЄС, З МЕТОЮ ВИЗНАЧЕННЯ ФАКТОРІВ ПРОГНОЗУ ПОВЕДІНКИ, ЯКА ВЕДЕ ДО ПОГАНОГО КОПІНГУ СТРЕСУ

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У цій статті подається загальний огляд теоретичної бази OPTIMI з акцентом на концепції «підвищеного ризику» стосовно депресії, адаптаційних стратегій та інших стресових розладів. У статті демонструється загальновизнаний зв'язок між стресом і початком депресії та підкреслюється значна залежність індивідуальних реакцій на стрес-фактори від їхніх проблемно-орієнтованих або емоційно-орієнтованих адаптаційних стратегій.

Ключові слова: депресія, стрес, підвищенний ризик, адаптація.

OPTIMI (ПРЕДИКАТИВНЫЕ ИНСТРУМЕНТЫ В РЕЖИМЕ ONLINE ДЛЯ ВОЗДЕЙСТВИЯ НА ПСИХИЧЕСКОЕ ЗДОРОВЬЕ) ПРОЕКТ «ЭЛЕКТРОННОЕ ЗДОРОВЬЕ», ФИНАНСИРУЕМЫЙ ЕС, С ЦЕЛЬЮ ОПРЕДЕЛЕНИЯ ФАКТОРОВ ПРОГНОЗА ПОВЕДЕНИЯ, ВЕДУЩЕГО К ПЛОХОМУ КОПИНГУ СТРЕССА

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В данной статье подаётся общий обзор теоретической базы OPTIMI с акцентом на концепции «повышенного риска» применительно к депрессии, адаптационным стратегиям и другим стрессовым расстройствам. В статье демонстрируется общепризнанная связь между стрессом и началом депрессии и подчёркивается значительная зависимость индивидуальных реакций на стресс-факторы от их проблемно-ориентированных или эмоционально-ориентированных адаптационных стратегий.

Ключевые слова: депрессия, стресс, повышенный риск, адаптация.