

Positive Technologies for Promoting Emotion Regulation Abilities in Adolescents

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Abstract. In recent years there is a growing interest in the use of emerging advanced technologies in supporting well-being and health promotion. Although few existing programs employ innovative technologies to foster social and emotional learning in adolescence, they do not specifically focus on emotion regulation skills. Further, research in this domain has primarily tested the efficacy of these trainings with one type of measurement technique at a time, although most recent theories highlight that emotions are multi-dimensional and multi-component processes. With the above in mind and to overcome these limitations, we developed a technology-enhanced protocol for the enhancement of emotion regulation, based on evidenced based program, the Building Emotion and Affect Regulation, age-adjusted and combined with virtual characters and wearable physiological sensors. The objective of this paper is to present an overview of the design and development process of this innovative protocol: EmoRegulators.

Keywords: Positive technology · Emotion regulation · Adolescents

1 Introduction

Emotion regulation (ER) refers to a set of processes involved in the initiation, maintenance and modification of emotion [1]. ER strategies are especially important during adolescence, when the transition from middle school to high school requires adolescents to develop new skills and to cope with new situations, and deficits in this area might result in psychosocial and behavioral problems [2]. Research has shown that students with well-developed social skills and emotional awareness are more motivated to engage in studies and to collaborate with peers and are better able to manage stress [3].

Today's students are called "digital natives": they are in their natural habitat when using technological interfaces [4], so that technology-enhanced interventions can be an attractive alternative for them compared to traditional ones. Although training programs that employ innovative technologies to foster social and emotional learning have been developed (e.g., Playmancer [5], eCircus [6], and Interstress [7]), they either are not targeted specifically to adolescents or focus on social and/or emotional issues, rather than on the specific aim of building ER skills. Moreover, the adoption of emerging advanced technologies in supporting well-being and health promotion has been recently highlighted within the Positive Technology paradigm, identifying the pathways of personal experience through which technology can build strengths and resilience in individuals, organizations and society [8]. Based on these premises, we propose an innovative technology-enhanced protocol aimed at enhancing ER abilities in adolescents. In the current paper we will present an overview of the process of the development and of the research design for testing its efficacy.

2 Adaptation of the BEAR Training to a Technology-Enhanced Protocol

Among existing interventions for children and youth, a recent program for strengthening the abilities of emotion regulation has shown preliminary promising results [9]: The Building Emotion and Affect Regulation (BEAR). The BEAR program is a group intervention geared for enhancing ER capacities in children (aged 7–12) and it was developed by the Israel Centre for the Treatment of Psychotrauma (ICTP) and implemented in Singapore, Israel and in the US. It is based on a number of theoretical and clinical sources [10–12], and it incorporates various components from several evidence-based interventions. The BEAR is an eight-session protocol. Each session focuses on a different domain of regulation, including physical, cognitive, emotion and social regulation and it includes the following themes: Becoming a Group; Resources; Physical Regulation; Cognitive and Emotional Regulation; Cognitive Behavioral Regulation; Interpersonal Regulation; and Social Support. The intervention is structured around the following core components, which are repeated in each of the session: Mindfulness exercises; Psycho-education; Experiential exercises; Narrative approach; and opening and closing rituals.

The design and development of the technology-enhanced version was carried out in different phases and involved three universities: the University of Milano-Bicocca (UNIMIB), the Hebrew University of Jerusalem (HUJI) and the University of Lisbon (IST-UL). A User-Centred Design was adopted and 4 schools and 2 youth organizations in Italy were involved. First, 5 focus groups were conducted with students aged 13–17. 3 main areas were analyzed: (a) stress experienced by adolescents in their day-to-day activities; (b) their physical awareness of stress effects and their coping abilities; (c) their expectations about a technology-enhanced training protocol. Then, during the development phase, 3 different graphic design versions were directly evaluated by 30 high-school students (15 male) and on the basis of the results, the

cartoon style version was selected. Finally different usability tests were conducted, to evaluate the total time required to complete the protocol and to have their opinions and suggestions about the interface of the training, the animation of the avatars and the biosensors adopted. The development of the training evolved step by step in response to the main findings. All sessions and exercises were adapted and adjusted for the relevant age group, and further changes and adaptations were made based on the youth experiences.

3 Definition of the Functional Requirements of EmoRegulators

Once the training was adapted, the various functional requirements were chosen and integrated:

Computational model: The computational model adopted is FATiMA [13, 14].

FATiMA (Fearnot AffectTive Mind Architecture) is an Agent Architecture with planning capabilities designed to use emotions and personality to influence the agent's behaviour. The architecture was recently extended with interpersonal emotion regulation capabilities [15] and this was the main reason why FATiMA was selected. In fact, our long-term goal is to create a virtual facilitator that is able to perceive the user's emotional state and help him cope with negative emotions that may arise from the use of the application. In the initial prototype version, we've only used the emotional reactive capabilities, fixing the appraisal process so that the emotions generated are always the same.

Software: Unity 3D was used as the development environment due to the existence of a large set of community-developed assets that can be used to extend Unity's functionalities, and due to the already existing integration of FATiMA Agent Architecture with Unity 3D.

Avatars: Daz 3D software was chosen for avatars. A cartoon graphic design was selected to avoid the uncanny valley problem [16], a well-known problem in games, 3D animation and robotics. Two cartoon style characters were used from the 3D library: Jason and Jasmine (See Fig. 1), for male and female user. Jasmine was also used for the assistant avatar modifying some physical characteristics, with the Genesis platform.

Biosensors: Bioplux sensors (See Fig. 2), a wearable device, non-invasive, able to connect in wireless, was used to obtain psycho-physiological data of HR, muscle activity and EDA. In addition, the physiological value of heart rate measured by the device was always displayed on the monitor, giving an immediate feedback to the user and, at the same time, obtaining an objective data of the effectiveness of the training.



Fig. 1. Facial female 3D avatar

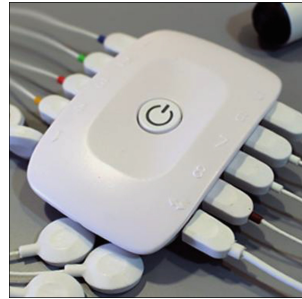


Fig. 2. Bioplux sensors

4 Conclusion and Next Steps

As mentioned, according to the PT approach, technology can increase emotional, psychological and social well-being [17] and with this vision in mind we've proposed an innovative technology-enhanced protocol aimed at enhancing ER abilities in adolescents. The main strength of this innovative tool is the combination of different advanced technologies: gamification aspects, virtual characters and wearable physiological sensors. In fact, it is widely recognized that stress detection technologies can help people better understand and relieve stress by increasing their awareness of heightened levels of stress that would otherwise go undetected [18]. Further, in the last couple of years, gamification has been a trending topic and a subject to much hype as a means of supporting user engagement and enhancing positive patterns in service use [19]. A limitation of this first prototype development was that no VR biofeedback was associated to the HR, although it has been shown to be more effective in inducing relaxation than simple audio and visual cues [20]. We took this choice since we wanted to test only the training itself, avoiding any other kind of variable that could influence the final result.

A pilot study is currently ongoing to explore the impact of Emoregulators, focusing on the feasibility and benefits of the innovative tool. We are testing in particular one specific session of the BEAR, physical regulation, developed in 3 different versions: (a) Written instructions at pc & 3D user's avatar doing exercises; (b) Instructions given by a 3D avatar-assistant & 3D user's avatar doing exercises; (c) Traditional adapted BEAR.

As said, in a future pilot version the Emotional Intelligent Component of FAtiMA will be added, so that avatars will become agents able to understand emotions of the user and able to behave accordingly. Further, we would like to integrate it with biofeedback, as an effective means of strengthening regulation abilities in youth.

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