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Towards personalized gamification to promote physical activity

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Objective:
Obesity has become an important public health problem in the USA. While data suggest that some improvements have been made, the prevalence of obesity among children and adolescents is still significant. This has motivated researchers to develop physically-interactive gamified applications (e.g., Exergames) that implements game elements to promote physical activity. These applications aim to exploit the elements of video games that make them engaging and motivating for children and adolescents. However, while several studies have shown promising results on the effect of gamification in promoting physical activity, researchers advise that more customization and personalization is needed since what motivates one individual might not motivate another.

Methods:
In this work, a physically-interactive gamified application in a virtual environment that promotes physical activity is introduced. The application required individuals to use full body motions to complete a sequence of physical tasks. The effects of the application on individuals' heart rate and motivation to perform the different physical activities are analyzed. Furthermore, the authors explore how machine learning algorithms and computer vision technology can be utilized to capture individuals' facial expression and heart rate data while they interact with the applications with the use of non-wearable sensors.

Results:
The preliminary results reveal that the application had a positive effect on motivating participants to perform the different physical activities. Moreover, they reveal that the application was able to produce a significant increase in participants' heart rate. Finally, the analysis indicates that participants' facial expression and heart rate data provide valuable information to identify the tasks that individuals might struggle to perform; thus, negatively impacting their motivation.

Conclusion:
Physically-interactive gamified applications can be implemented to promote physical activity among children and adolescents. Moreover, capturing facial expression and heart rate data while individuals interact with gamified applications can potentially be used to personalize the application in order to maintain high levels of motivation and physical activity.