

55 POSITIVE EFFECTS OF VIDEO GAMES

**Visual-Spatial Skills** Several studies show that video game play can improve a wide range of visual and spatial skills.<sup>27–29,56</sup> Correlational studies have found positive associations between gaming experience and performance in numerous visual tasks, such as target localization<sup>29</sup> and faster visual reaction times.<sup>8</sup> Experimental studies have demonstrated that even as little as 10 hours of videogame play can improve spatial attention and mental rotation.<sup>27,57</sup> These beneficial effects may have a range of practical applications. For example, an early experimental study showed that Israeli Air Force cadets trained using the game *Space Fortress 2* had better subsequent flight performance.<sup>58</sup> As a result, the game became a part of the training program of the Israeli Air Force. The largest enhancements to visuospatial processing have been shown for fast-paced action games, which also often contain violence.<sup>8</sup> This fact illustrates the point that the effects of video games are not simple, and a game can simultaneously have positive effects (increased visuospatial skills) and negative effects (increased aggressive emotions, thoughts, and behaviors).

**Educational Video Games** Video games are highly effective teachers. Well-designed video games are attention-grabbing, set clear objectives, provide feedback and reinforcement, actively involve the player, offer adaptable levels of difficulty, and use many other powerful teaching techniques.<sup>20</sup> A wide range of educational games have been developed, taking advantage of these features of video games and using them to teach specific knowledge and skills.

**Schools:** Video games have been successfully used to teach children and adolescents a variety of topics, such as reading skills, mathematics, and biology.<sup>9,59</sup>

**Business:** Video games are often used to teach job skills to employees. For example, Canon USA uses a video game to train copier technicians, Volvo uses an online game to teach car sales employees, and the US military uses video games to train combat skills and increase recruitment.<sup>60,61</sup>

**Health-related outcomes:** Games have been developed to teach youth about smoking, diabetes, and cancer.<sup>62–64</sup> These games have been shown to be highly effective. For example, asthmatic children who played the game *Bronkie the Bronchiasaurus* showed significant improvements in their knowledge about asthma and self-care behaviors.<sup>62</sup>

**Exergames** Video games have traditionally been a sedentary activity. However, in recent years a new type of video game has emerged that requires interactive physical activity. Exercise games, or exergames, combine video games and exercise.<sup>65</sup> Prot et al<sup>65</sup>

Author's personal copy Active games, such as *Dance Dance Revolution* and *Wii Fit* can increase energy expenditure, prolong time spent in physical activity, and increase preference for physical activity among players.<sup>66–68</sup> Exergames have been shown to increase engagement and enjoyment. For example, a 6-week-long training study demonstrated that interactive videobikes increase adherence to a training program and attitudes toward exercise compared with traditional bikes.<sup>10</sup> Particularly positive attitudes toward exergaming are found among sedentary individuals, indicating that this may be an effective way of increasing physical activity in this group.<sup>65</sup> It is a worrying fact that American children tend to spend more than 6 hours per day watching television and playing video games, yet almost half of preschool children do not meet recommended levels of physical activity of at least 1 hour per day prescribed by the American Academy of Pediatrics.<sup>3,69</sup> Given the tremendous popularity of videogames among youth, combining gaming and physical activity may be a good strategy to increase physical activity among children and adolescents.