When Feedback Leads to False Confidence: A Curious Outcome of a Game-Based Health Intervention

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Abstract

Whack-a-Mole is a melanoma identification training game developed at the University of Miami to evaluate the effectiveness of different identification training techniques using immediate personalized feedback. Two widely implemented training systems are used to identify malignant melanoma through a skin exam: ABCDE, a mnemonic for the five factors that increase likely diagnoses, and the ugly duckling sign (UDS). The game system randomized the training types the player received, in addition to a hybrid approach and a control condition. The game delivered standard and motivational feedback to a subset of players in each of these conditions as they identified moles. Both the standard feedback and motivational feedback led to higher perceived self-efficacy as compared to conditions with no feedback, regardless of whether or not the player was successful at identifying malignant moles.

Description of Whack-a-Mole and Original Study

Whack-a-Mole was designed as a reimagining of Factitious (Farley et al., 2018), a game that asks the player to discern between real and fake news via a swipe left/swipe right Tinder mechanic. Players take on the role of Sherlock Moles, a detective on the hunt for the moles that give moles everywhere a bad name. Upon reviewing a picture of a real mole, players swipe left to classify it as concerning or swipe right to classify it as safe (see Figure 1). The game implements 4 feedback conditions: ABCDE, ABCD-F, UDS, and a control that presents no feedback.

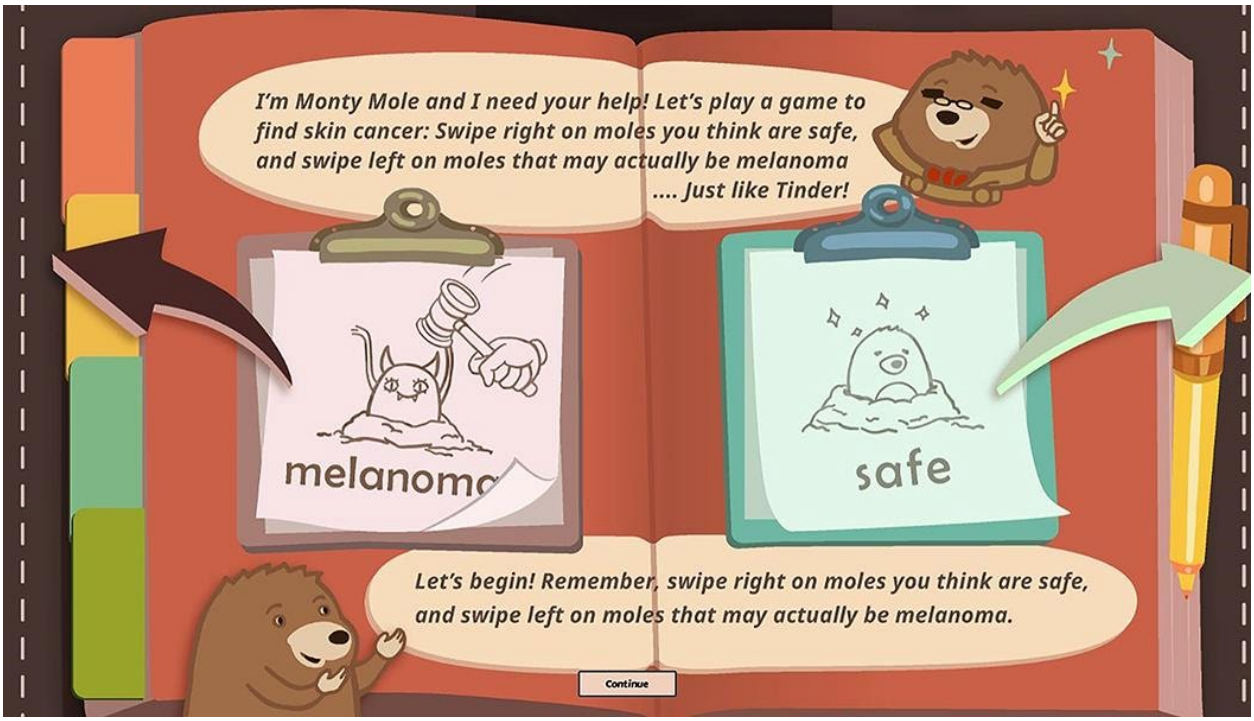

Figure 1

Whack-a-Mole game tutorial screen

ABCDE, ABCD-F, and UDS

ABCDE is a mnemonic of the five factors that increase likelihood of a melanoma diagnosis. These factors are Asymmetry, Border irregularity, Color variegation, Diameter, and nevi which Evolve over time. A shortcoming of the ABCDE rule is the difficulty in detecting small melanomas and those without abnormal shape or color. This has led to UDS training as a way to encourage clinicians and patients to look for the mole that looks different from others around it, hence the "ugly duckling." Some have suggested updating the mnemonic to include F for Funny looking, incorporating the UDS rule within the ABCDE framework. We chose to add a condition that would incorporate this hybrid approach, while excluding the 'E' condition as the static images used in the game don't allow to show the evolution of a mole over time. Thus, we called this condition ABCD-F.

Feedback Conditions

The study investigated two forms of feedback for melanoma identification. The first feedback condition only assesses the participant categorization of a mole. After categorizing a mole, the player learns if they were correct or incorrect (see Figure 2). If the player chooses the incorrect categorization, they also are given feedback on why that was (see Figure 3). The second condition evaluates the participant categorization in addition to motivational feedback. This feedback includes messages to increase both self-efficacy and response efficacy in skin cancer self-exams. This study found that training and feedback lead participants to be more confident in their abilities to identify malignant melanoma, with the caveat that there was no correlation between the player's actual ability to identify malignant melanoma

(Sanchez, 2021). Moreover, higher perceptions of confidence were found to be associated with stronger skin-cancer prevention intentions, while the actual ability of melanoma identification was not (Sanchez, 2021).

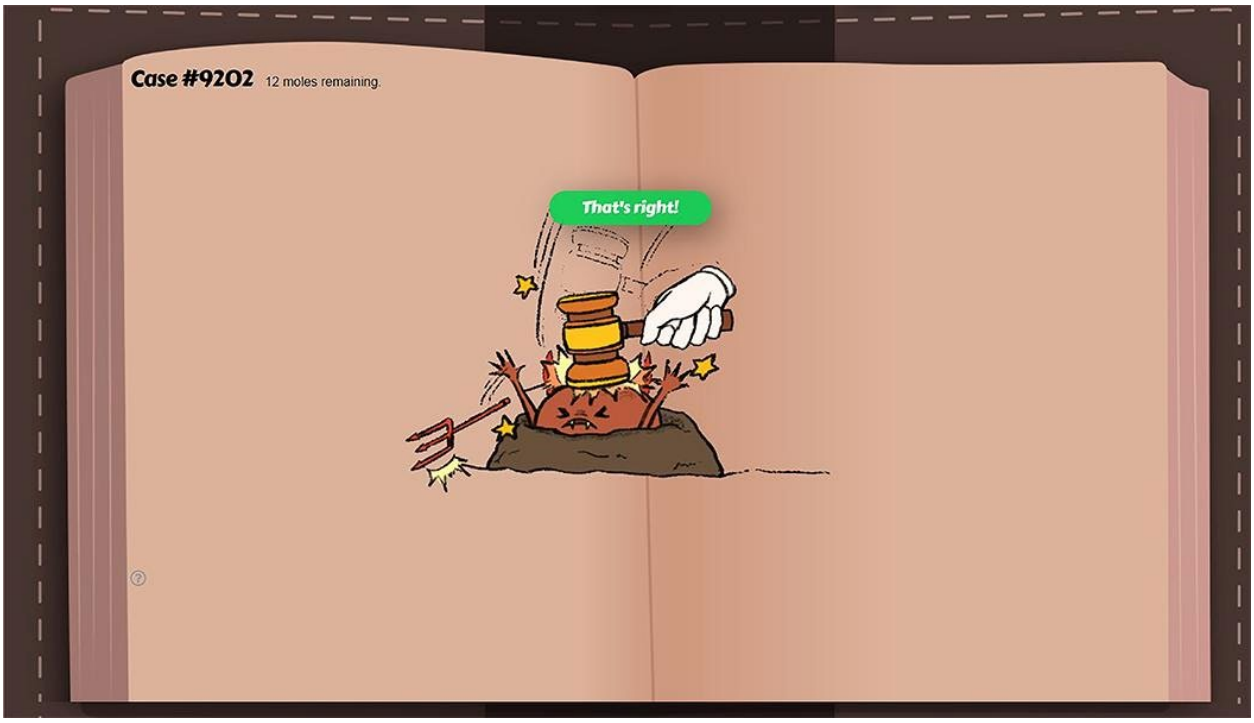

Figure 2

A player correctly guesses that a mole requires further examination

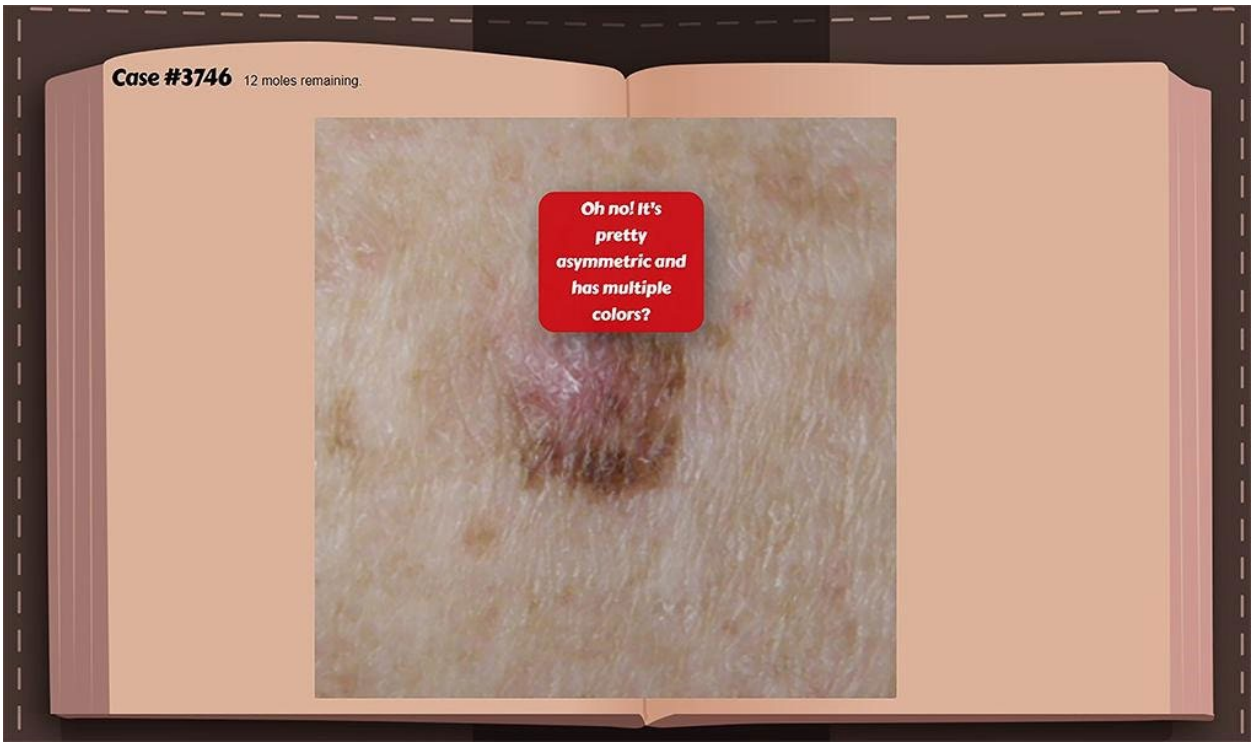

Figure 3

A player incorrectly guesses that a mole does not require further examination

Considerations for Games That Can Lead to False Confidence

False confidence, or the non-association (or even opposing association) between perceived health knowledge and actual performance is not uncommon in previous studies (e.g., Park et al., 2017; Peng et al., 2019; Waters et al., 2018). While providing feedback in pro-social games is intended, and seems like a effective feature to make users become more confident and increase their engagement, there is no consistent evidence between the inclusion of feedback and actual performance improvement (Kluger & DeNisi, 1996; Drummond et al., 2017; Kao et al., 2021; Yin et al., 2012; Zhang et al., 2021). Some feedback formats, such as real-time scoring and motivational praise during gameplay may even distract users and lead to poorer performance (Hattie et al., 2002; Katz et al., 2014; Brom et al., 2019)

A person with false confidence in their ability to solve a Wordle puzzle is most likely harmless. However, in the case of *Whack-a-Mole*, we should weigh the cost of a general public that is more accepting of preventative strategies for skin cancer, such as an annual skin exam, versus the potential of a population that has false sense of confidence in their ability to perform a medical diagnosis before using it as an intervention. As games become increasingly popular as a mainstream medium for health education and knowledge (Drummond et al., 2017; DeSmet et al., 2015; DeSmet et al., 2014), this is something that can be applicable to the pre-production phase of game development with a broad dialogue about ethics. We are quick to point out the positive outcomes of feedback in games, but perhaps a dose of skepticism from the beginning is healthy. While feedback is important for knowledge, confidence and engagement, how it should be implemented in pro-social, and more specifically, health games to improve actual performance warrants more research.

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