Structure of Corrective Feedback for Selection of Ineffective Vegetable Parenting Practices for Use in a Simulation Videogame

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Abstract

A serious videogame is being developed to train parents of preschool children in selecting and using parenting practices that are likely to encourage their child to eat more vegetables. The structure of feedback to the parents on their selection may influence what they learn from the game. Feedback Intervention Theory provides some guidance on the design of such messages. The structure of preferred performance feedback statements has not been investigated within serious videogames. Two feedback formats were tested for a player's preferences within the context of this videogame. Based on Feedback Intervention Theory, which proposes that threat to self-concept impairs feedback response, three-statement (a nonaffirming comment sandwiched between two affirming comments, called "Oreo" feedback, which should minimize threat to self-concept) and two-statement (a nonaffirming comment followed by an affirming comment) performance feedbacks were tailored to respondents. Tailoring was based on participants' report of frequency of use of effective and ineffective vegetable parenting practices and the reasons for use of the ineffective practices. Participants selected their preference between the two forms of feedback for each of eight ineffective vegetable parenting practices. In general, mothers ($n=81$) (no male respondents) slightly preferred the "Oreo" feedback, but the pattern of preferences varied by demographic characteristics. Stronger relationships by income suggest the feedback structure should be tailored to family income. Future research with larger and more diverse samples needs to test whether perceived threat to self-concept mediates the response to feedback and otherwise verify these findings.

Introduction

PROVIDING FEEDBACK TO INFLUENCE BEHAVIOR (called Feedback Intervention Theory) has been shown to both negatively and positively influence behavior.[1] Feedback to change behavior has been most studied in the context of learning clinical skills.[2–5] A meta-analysis indicated feedback could change behavior when it suggested specific changes and the suggestions were made in writing and were made frequently.[5] Some forms of feedback could backfire or insult the person trying to be reached.[3] Feedback that affirms an accomplishment or a performance (e.g., report of success or an appropriate selection) tends not to threaten self-concept, but feedback that reports less than acceptable performance (i.e., report of failure or inappropriate selection) may.[3]

Within videogames, feedback is often provided using points to reflect the successful achievement of tasks.[6] An alpha test of our serious videogame to teach parents better parenting practices to have their child eat vegetables, however, revealed that most parents did not see either of two visual indicators displaying points achieved (which provided both affirmative and nonaffirmative feedback), did not understand them, and had no intention of electively viewing the indicators in future game play.[7] Thus, a challenge to providing effective nonaffirmative feedback within a serious videogame for learning parenting skills is to avoid threatening a player's self-concept. Providing the non-affirmative feedback sandwiched between two affirming messages (called "Oreo" feedback) should minimize the threat, but it may only lengthen the reading time, which may be aversive.

This article reports a study that tested parent preferences for receiving feedback ("Oreo" versus shorter) on their parenting practice selections that were offered in our videogame.

TABLE 1. EFFECTIVE AND INEFFECTIVE VEGETABLE PARENTING PRACTICES FOR PARENTS OF PRESCHOOL CHILDREN
AND THE REASONS THEY WERE CONSIDERED EFFECTIVE OR INEFFECTIVE

Vegetable parenting practices, statement	Reasons considered effective or ineffective
Effective	
1. Vegetables will make you strong.	1. Providing rationale
2. Hmmm, this is really good, try it.	2. Modeling parent preference
3. Look, I'm eating my veggie. Why don't you try yours?	3. Modeling parent intake with positive suggestion
Ineffective	
1. If you don't taste the veggie, you can't go play.	1. Punishing—non-food
2. You can't get up from the table until you taste the veggie.	2. Punishing—non-food
3. No dessert until you eat your veggie.	3. Punishing—food
4. It's a veggie and I have a new toy for you if you taste it.	4. Contingency management—non-food
5. You can have some candy if you taste the food.	5. Contingency management—food
6. I'm going to be sooo sad if you don't taste the veggie.	6. Guilt—sad
7. Make me happy and just eat your veggie.	7. Guilt—happy
8. Just eat it.	8. Command

Subjects and Methods

Overview

An Internet survey was designed to solicit preference for types of feedback in response to selection of vegetable parenting practices. The research was approved by the Baylor College of Medicine Institutional Review Board. Because of the low risk nature of the research, parent informed consent was obtained by the parent electronically choosing "I agree" (or "I do not agree") to provide answers to questions in a survey.

Game

"Kiddio" is a serious casual videogame for use on smartphones to train parents of preschool children in the selection of effective parenting strategies to get their child to eat vegetables (a commonly reported problem among preschoolers). The scientific foundation for the parenting practices is research on what parents do to get their child to eat vegetables over the longer term[8] (i.e., not just at that meal). One episode of the game has been developed that simulates an interaction with a preschooler, named Kiddio. The parent selects from several vegetables in various forms and serves it to Kiddio, who promptly says, "That is yucky," and refuses to eat it. The parent is offered a selection of four parenting statements (two effective and two ineffective based on our research[8]) but can also select from three possible actions that minimize distractions (removing toys from the table, turning the TV off, or closing the door to the backyard) and a disciplinary "time out" procedure. The player starts at the midpoint of a seven-step ladder. To win, the player needs to select at least three effective parenting practices in 2 minutes. Selection of ineffective practices moves the player toward losing the videogame at the bottom of the 7 point scale. A point indicator and a colored continuum (red to green) displaying points accumulated were offered to reflect selections of effective and ineffective practices. At the end of the game, the player is asked if she or he would like to play again. When the player says no, she or he is asked to set a goal to use one of the effective vegetable parenting practices (EVPP) with the child at home. Our intent is to develop 20–25 such episodes distributed across different locations (e.g., grandma's house, fast food place) that would introduce levels of difficulty and new problems with which the player would have to deal.[9]

Alpha test

The "Kiddio" episode was submitted to an alpha test (i.e., a test with end users early in development to identify and enable modifications responsive to user preferences) with 16 parents of preschool children from diverse ethnic backgrounds.[7] Qualitative interviews were used to permit investigation of issues raised by the players. In general, most parents understood the purpose and rules and enjoyed playing the session, but they provided many suggestions to enhance enjoyment and effectiveness.[7] In regard to feedback, the players reported that they either did not notice or did not

TABLE 2. POSSIBLE PARTICIPANT REASONS FOR WHY THEY USED THE INEFFECTIVE VEGETABLE PARENTING PRACTICE
AND A REFORMULATION FOR USE IN THE FEEDBACK STATEMENT

Reason	Reformulated reason in feedback
1. It's worked before with my child.	1. Although it may have worked before…
2. It's what I usually/always do.	2. Doing what you usually do by…
3. I was frustrated.	3. Mealtimes can be frustrating at times, but…
4. I was upset.	4. But insisting…when you are upset…
5. It's easy to do.	5. Although it's easy to…
6. It's what I've seen others do.	6. But insisting…like you have seen others do…
7. My friends told me to try this.	7. Just because a friend suggested that you…
8. It's what I grew up hearing.	8. We all do what we learned growing up, but…

Table 3. "Oreo" (Positive–Negative–Positive) and Non-"Oreo" (Negative–Positive) Feedback Statements for the Most Commonly Provided Feedback

"Oreo" (positive–negative–positive) feedback	Non-"Oreo" (negative–positive) feedback
Telling your child that veggies will make him or her strong is a great way to encourage him or her to eat them. Although insisting they sit at the table until they eat their veggie may have worked before, it is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.	Although insisting they sit at the table until they eat their veggie may have worked before, it is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.
Telling your child that veggies will make him or her strong is a great way to encourage him or her to eat them. But at times it may seem easier to insist your child sit at the table until he or she eats the veggies. However, this is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.	At times it may seem easier to insist your child sit at the table until he or she eats the veggies. However, this is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.
Telling your child that veggies taste good is a great way to encourage him or her to eat them. Although insisting they sit at the table until they eat their veggie may have worked before, it is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.	Although insisting they sit at the table until they eat their veggie may have worked before, it is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.
Eating your veggies is a great way to show your child that you like them, and it may help to encourage him or her to eat them also. Although insisting they sit at the table until they eat their veggie may have worked before, it is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.	Although insisting they sit at the table until they eat their veggie may have worked before, it is not the best way to get them to eat veggies as they get older. Instead, give your child a choice by serving two different veggies at a meal and allow him or her to select which one he or she would like to eat.

understand the red–green bar or the point indicator, both used to reflect points (in different formats) accumulated from the parenting selections made in the game. Although they might attend to a public leader board of accumulated points at the end of an episode, they requested text messages on their choices during the game, which led to this project.

Sample

The inclusionary criteria were being a parent of a healthy preschooler who resided with the child at least 75 percent of the time. Access to the Internet survey implied access to a computer and access to adequate-speed Internet connection. Recruitment procedures included placing flyers around the Texas Medical Center campus (about 100,000 diverse employees), e-mails to (1) the list serve of the Houston Hispanic Health Coalition, (2) parents listed in the Children's Nutrition Research Center's research volunteer database with preschool children, and (3) past participants in related studies, and posting solicitation announcements on the Baylor College of Medicine and Children's Nutrition Research Center Web sites. As compensation, participants were offered a raffle for a $50 gift certificate.

Web-based questionnaire

The questionnaire tailored form of desired feedback to a parent's report of using EVPP or ineffective vegetable parenting practices (IVPP). First, parents were asked how frequently they performed each of the three EVPP and then each of eight ineffective (determined from previous research[10]) IVPP with one of four response categories (never, rarely, sometimes, often) (Table 1). When a participant responded "never" or "rarely," she was shown the next IVPP to obtain a frequency response. When the participant selected "sometimes" or "often," she was asked her reason for using that IVPP (Table 2) and to select between two forms of feedback. The four component ("Oreo") feedback started with an affirming statement about their most frequently performed EVPP, followed by their reported reason for doing that IVPP reformatted for feedback, followed by a statement that the IVPP was not likely to be effective, and ending with a sentence suggesting an EVPP as a replacement. Examples are on the left side of Table 3. The non-"Oreo" feedback deleted the initial statement of the most frequently performed EVPP but provided the restated reason, the IVPP not being effective, and ended with an

alternative EVPP to try. Examples are provided on the right side of Table 3.

Analyses

The questionnaire included 33 questions; however, to minimize respondent burden and to ask questions that only reflected the respondents' usual practices, respondents were only asked those questions and choices that reflected their pattern of responses (i.e., if they responded "never" or "rarely" to the IVPP items, no further questions were asked in regard to that IVPP). Although there were 81 respondents, not all respondents made the same choices. For each IVPP, the "Oreo" versus non-"Oreo" preferences were identified. Only four IVPP (1, 2, 3, and 8) had a sufficient number of responses to permit further analysis. For those four IVPP, we analyzed whether differences occurred in the "Oreo" versus non-"Oreo" choices by respondent education, income, and ethnicity, using first-order Rao–Scott corrected chi-squared tests of difference in distributions.[11,12]

Results and Discussion

There were 81 respondents (all female), with roughly equal groupings for income (<$60,000 versus ≥$60,000), education (some college or below versus college graduate versus postgraduate study), and ethnic group (black/African Americans versus white versus other) (Table 4).

The most commonly used EVPP were "Vegetables make you strong" ($n=45$), followed by "Hmm, this is really good! Try it!" ($n=24$) and "Look, I'm eating my veggie. Why don't you try yours?" ($n=12$). The most commonly reported reasons for using an IVPP were "It's worked before with my child" ($n=90$), followed by "I was frustrated" ($n=43$), "It was easy" ($n=39$), "It's what I grew up hearing" ($n=33$), and "It's what I usually/always do" ($n=30$).

TABLE 4. DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS (N = 81)

	Frequency	Percentage
Highest level of educated completed in home		
High school graduate or GED	3	3.7
Technical school	3	3.7
Some college	20	24.7
College graduate	26	32.1
Postgraduate study	29	35.8
Total	81	100.0
Annual family household income in 2010		
Less than $10,000	4	4.9
$10,000–$19,999	4	4.9
$20,000–$39,000	14	17.3
$40,000–$59,999	16	19.8
$60,000 or more	43	53.1
Total	81	100.0
Ethnicity		
Black/African American	24	29.6
White	32	39.5
American Indian or Alaska Native	1	1.2
Native Hawaiian or Pacific Islander	1	1.2
Asian non-Vietnamese	4	4.9
Vietnamese	1	1.2
Hispanic	17	21.0
Other	1	1.2
Total	81	100.0

GED, General Educational Development.

Although there was a slight preference for the "Oreo" ($n=142$) versus the non-"Oreo" ($n=126$) feedback, there were demographic differences. Lower income individuals and those with postgraduate education tended to prefer the "Oreo" feedback, whereas the higher income individuals and those

TABLE 5. PARENT-REPORTED SELECTION OF "OREO" (THREE SENTENCES) OR NON-"OREO" (TWO SENTENCES) FEEDBACK FOR EACH OF FOUR INEFFECTIVE VEGETABLE PARENTING PRACTICES BY DEMOGRAPHIC CHARACTERISTICS

	Sample IVPP selected by type of feedback preferred							
	If you don't taste the veggie, you can't go play (n=56)		You can't get up from the table until you taste the veggie (n=57)		No dessert until you eat your veggie (n=65)		Just eat it (n=56)	
Demographic characteristic	Non-"Oreo" feedback (2-S)	"Oreo" feedback (3-S)	Non-"Oreo" feedback (2-S)	"Oreo" feedback (3-S)	Non-"Oreo" feedback (2-S)	"Oreo" feedback (3-S)	Non-"Oreo" feedback (2-S)	"Oreo" feedback (3-S)
Income								
<$60,000	13	15	7	17[b]	8	19[a]	8	14[b]
≥$60,000	11	17	23	10	20	18	27	7
Education								
Some college or below	10	7[b]	11	7[b]	9	9	17	8
College graduate	11	13	15	7	11	11	10	10
Postgraduate study	3	12	4	13	8	17	8	3
Ethnicity								
Black/African American	3	11[b]	5	6[b]	10	10	8	12[b]
White	11	7	21	11	12	15	17	4
Other	10	14	4	10	6	12	10	5

[a]$P<0.05$, [b]$P<0.01$.
2-S, two-sentence feedback preferred; 3-S, three-sentence feedback preferred; IVPP, ineffective vegetable parenting practices.

with less than a college education tended to prefer the non-"Oreo" feedback, with the college graduates more evenly divided (Table 5). Patterns of preference by ethnic group varied by IVPP. The relationships were stronger by income, suggesting tailoring the feedback statement in the game to income would be more effective. This needs to be confirmed in other larger samples, and other moderators need to be tested.

This was the first study of the structure of feedback statements for use in a videogame. A strength of the study was the testing of highly tailored feedback statements, reflecting respondents' EVPP, IVPP, and reasons for performing the IVPP. Although the study had intriguing findings, there were several limitations. A small sample limited the level of detail in the analysis and confidence in the findings. Also, a self-selected sample was used; thus it is not clear to what population the findings generalized. No males participated. We did not assess self-concept to verify "threat to self-concept" as a variable mediating message structure and acceptability. Feedback was not provided within the context of an interactive videogame, which might have induced other preferences and from which impact on player performance would have been valuable. Participants may not have perceived the messages as affirming or nonaffirming or may have responded to the length of the messages rather than the content. The length of the messages in this study may need to be structured to fit and be readable on a smartphone screen. Further research is needed to address these issues.

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