An Empirical Investigation of Feedback Sequencing on Emotion Regulation Processes

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Abstract
The effects of receiving feedback on course assessments have emotional implications for students (e.g., Ryan & Henderson, 2018) that extend to motivation and behavior (Boud & Falchilvov, 2007). Receiving negative feedback, then, may have harmful effects on students' emotions, motivation, and performance. A way in which students' emotions may be regulated is through employing the "feedback sandwich" (Dohrenwent, 2002). The method focuses on variability in feedback ordering, and specifically holds that "sandwiching" constructive feedback in between two positive statements is the most effective way to deliver negative feedback to students. While widely discussed in the popular press, there exists little empirical research on the effectiveness of method, and to date, only one study has examined the effects of the feedback sandwich on emotion regulation. This study presents an empirical test of the effects of feedback sequencing on emotion regulation. Results indicate that the sandwich method did not have an effect on either positive or negative emotion. Results are discussed in light of their theoretical and applied implications for feedback sequencing.

Keywords: Feedback Sequencing, Feedback Sandwich, Emotion Regulation

Introduction

Receiving feedback from instructors can be an emotion-inducing experience for students. The effects of these emotional experiences may influence a host of educational outcomes, such as performance and motivation (e.g., Boud & Falchilvov, 2007). Receiving negative feedback, then, may have harmful effects on students' emotions, motivation, and performance. Thus, it is important to understand how students' negative emotions may be regulated when receiving negative feedback.

A way in which students' negative emotions may be regulated is through employing the "feedback sandwich" (Dohrenwent, 2002). The method focuses on variability in feedback ordering, and specifically holds that "sandwiching" constructive feedback in between two positive statements is the most effective way to deliver negative feedback to students.

While widely discussed in the popular press, there exists little empirical research on the effectiveness of method, and to date, only one study has examined the effects of the feedback sandwich on emotion regulation. While this study failed to find an effect of the feedback sandwich, the study lacked sufficient power to detect an effect, which may explain the findings (Dolan, Covert, Keppel, & Fleming, 2021). This study presents an empirical test of the effects of feedback sequencing on emotion regulation in a sample of college students.

Feedback and Emotion

Emotions are produced when individuals feel that a stimulus in their environment (in this case, feedback on an assignment) relates to their goals (Lazarus, 1991). Under normal conditions, students have the goal of doing well in a class, which includes receiving good grades and having a command of the course content. Receiving feedback from their instructors is a major way in which students can learn about their goal pursuit.

Negative emotions, according to Lazarus (1991), arise when one's goal pursuit is thwarted, and may result in emotions such as anxiety, sadness, grief, and despair. A common feature of these emotions is that they are experienced when a situation is perceived as harmful to one's own goal pursuit or values. In the case of the current study, negative emotions likely arise when instructor feedback indicates that the student did not perform well on an assignment.

On the other hand, students experience positive emotions when they believe that they have made progress toward a goal (Lazarus, 1991). Resulting emotions from goal progression may include happiness, joy, or excitement. A common feature of these emotions is that they are experienced when a situation is perceived as beneficial to, or congruent with, one's own goals or values.

A second way in which a situation, and in this case, feedback, may influence emotion is through the extent to which a situation is more or less congruent with their goals. That is, the more incongruent a situation is with one's goals, the less intensely one will experience the positive, or negative emotion. Alternatively, the more incongruent a situation is with one's goals, the more intensely one will experience the positive, or negative emotion.

In many cases, and following hedonistic principles, people tend to want to continue, or enhance, their experience of positive emotions, and discontinue, or diminish, their experience of negative emotions (Gross, 1998). Although individuals may enhance or diminish their

emotional experiences on their own, outside factors may also help individuals alter their emotional experiences (e.g., Thayer et al., 1994; Rimé, Philippot, Boca, & Mesquita, 1992). Therefore, the nature of instructor feedback may be a powerful force in regulating the emotions of students when receiving feedback.

Emotion Regulation

Instructor feedback may be a powerful force in producing emotional experiences in students, and these experiences may go on to have the ability to impact performance, motivation, and cognition. (e.g., Boud & Falchilvov, 2007). Therefore, it is worthwhile to explore feedback has the potential to incite emotion within targets, and that these emotions may impact a host of cognitive, motivational, and behavioral variables, it is worth exploring how negative emotions resulting from feedback may be mitigated. A useful theoretical paradigm to better understand how emotions may be altered is that of emotion regulation. Gross (1998) developed the process model of emotion regulation to explain the process that occurs when individuals alter the "emotions they have, when they have them, and how they experience and express them" (Gross 1998b, p. 275).

Although typically examined as an intrapersonal process, considerable research suggests that communication is a principal vehicle through with emotion regulation processes occurs, and further indicates that communication messages have the ability to regulate emotion (e.g., Cannava, High, Jones, & Bodie, 2018; Hersh, 2011; Holman & Niven, 2019; Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998; Williams, Morelli, Ong, & Zaki, 2018). Thus, in the context of this study, variations in instructor feedback messages may have the ability to regulate or mitigate negative emotion associated with receiving feedback.

The Feedback Sandwich

Of course, the language of the feedback will have an influence on emotion regulation processes within students. Another possible route to inciting emotion regulation processes within students is the sequencing of feedback statements. Feedback sequencing refers to how both positive and corrective feedback statements may be strategically ordered to enhance effectiveness.

In the popular press, the feedback sandwich method has attracted a great deal of attention (e.g., (Dohrenwent, 2002; Schwarz, 2013). The feedback sandwich method focuses on variability in the sequencing of positive and corrective feedback, and specifically argues that sequencing can have profound effects on a host of educational variables, including student perceptions (e.g., self-efficacy), motivation, and performance.

According to Dohrenwent (2002), sandwiching corrective feedback statements in the middle of positive feedback statements is considered more effective for recipients compared to other orderings (e.g., two positive feedback statements followed by corrective feedback). Emotion plays a central role in the success of this method; Inherent in this process is emotion; employing this particular sequencing is argued to lead to fewer negative emotional experiences compared to other sequences of feedback (e.g., Schwarz, 2013).

As mentioned previously, the feedback sandwich has been widely discussed in popular press (e.g., Dohrenwent, 2002; Prochazaka, Ovcari, & Durinik, 2020; Schwarz 2013). However, the method has not generated much empirical research to date. The limited number studies

conducted on instructor feedback sequencing and receiver perceptions suggest that the feedback sandwich method increases receiver judgements related to the usefulness and effectiveness of feedback than other sequences of feedback (e.g., Davies & Jacobs, 1985), but may not be effective as other sequences at inducing improved student performance (e.g., Parkes, Abercrombie, & McCarty, 2013; Prochazaka et al., 2020). Overall, the primary agreement among the small amount of available research suggests that feedback sequencing may affect judgments within receivers; however, the processes through which this relationship occurs is largely unclear.

With regard to emotion, to date, only one study has examined the effects of the feedback sandwich on emotion regulation (Dolan et al., 2021). While this study failed to find an effect of the feedback sandwich, the study lacked sufficient power to detect an effect, which may explain the findings.

The Current Study

The current study seeks to explore the following question: Does feedback sequencing affect students' emotional experiences? In this between-groups experiment, we vary the sequencing of three feedback statements and to examine the effects of sequencing on emotion regulation processes. Based on literature, originating from both popular press and the academic literature, we propose the following hypotheses:

H1: The feedback sandwich method will lead to lower levels of self-reported negative emotion compared to other feedback sequences.

H2: The feedback sandwich method will lead to higher levels of self-reported positive emotion compared to other feedback sequence conditions.

Methodology

Design and Procedures

A total of 288 participants took part in this between-groups experimental study. Participants were recruited from undergraduate classes at a mid-sized public university in the Northeastern United States. Participants ranged in age from 18 to 34 and were mostly female.

Once agreeing to participate in this study, participants were told that this survey focused on the effects of feedback on emotion and cognition. Participants were asked to imagine a hypothetical scenario in which they were taking a class and needed to complete two papers, each worth 25% of their grade. They were then told that when they logged into their learning management site, they received a grade on their first. Next, participants were told to further imagine that they clicked a link to feedback for their assignment. It is at this point that participants were randomly assigned to one of six feedback conditions representing all possible combinations of the following statements.

Participants were randomly assigned to one of seven conditions. Six conditions represented all possible sequences of two positive feedback statements and one constructive feedback statement. The two positive feedback statements were as follows: "The structure of your paper is good" and "You have the potential to do good work". The corrective feedback statement was as follows: "Your understanding of the content is incorrect". A seventh

condition served as a control condition. This condition did not present participants with any qualitative feedback.

To test for the emotion regulation effects of feedback sequencing, all participants completed emotion measures after they read their condition messages. Doing so allowed us to test for emotion differences between groups. Systematic differences between groups would signify that the feedback sequencing had a distinct effect on emotion regulation processes. To account for possible confounding variables, we also controlled for emotion regulation variables including tendencies to regulate through cognitive appraisal and suppression, as well as difficulties in emotion regulation.

Measures

To examine emotion, we used the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to understand the types of emotions participants experienced after reading the feedback. This scale uses 20 items rated on five-point Likert-type response scales ranging from *very slightly* or *not at all* to *extremely* to examine 10 positive and 10 negative emotions. The ten items used to measure positive emotion were combined into a single scale and the ten items used to measure negative emotion were combined into a single scale. See Table 1 for reliabilities and descriptives.

Control variables included cognitive reappraisal and expressive suppression emotion regulation tendencies and difficulties in emotion regulation. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) was used to measure the two facets of emotion regulation: cognitive reappraisal and expressive suppression. We measured difficulties in emotion regulation using the Difficulties in Emotion Regulation – Short Form (DERS-SF; Kaufman, Xia, Fosco, Yaptangco, Skidmore, & Crowell, 2015), which uses 18 items to measure participants' trait difficulties in managing their emotions. Reliabilities and descriptives for all scales used in the study are found in Table 1.

	N	*M* (*SD*)	α
Positive Emotion	*281*	2.25 (0.62)	.76
Negative Emotion	281	3.32 (0.87)	.88
Cognitive Reappraisal	286	4.84 (1.04)	.83
Expressive Suppression	286	3.97 (1.29)	.87
DERS	285	2.62 (0.59)	.77

Table 1: Reliabilities and Descriptives

Results

Collapsing Conditions

Six experimental conditions represented all possibilities of feedback sequencing. As a result, two conditions represented the sandwich method, two conditions presented of positive feedback first, and two conditions presented constructive feedback first. We first examined if there were mean differences in our outcome variables in these three main conditions using a series of independent samples t-tests.

We identified no differences in our sandwich, positive first, and constructive first conditions (see Table 2 for condition means and results of t-tests). In turn, we collapsed each of these conditions and in turn were left with a total of three feedback sequencing conditions: Sandwich, Positive First, and Constructive First. Our fourth condition represented our control condition. See Table 3 for condition means for collapsed and control conditions.

Condition	Sandwich		Positive First		Constructive First	
	1	2	1	2	1	2
Positive Emotion						
M	2.21	2.38	2.16	2.27	2.31	2.07
(SD)	(0.58)	(0.64)	(0.59)	(0.68)	(0.61)	(0.58)
t (df)	-1.26 (82)		-0.79 (80)		-1.72 (75)	
p	.21		.43		.08	
Negative Emotion						
M	3.37	3.26	3.37	3.23	3.26	3.39
(SD)	(0.70)	(0.94)	(0.77)	(0.96)	(0.88)	(0.93)
t (df)	0.63 (82)		0.75 (80)		-0.58 (75)	
p	.53		.46		.56	
Cognitive Reappraisal						
M	4.59	5.00	5.06	4.83	4.57	4.85
(SD)	(1.15)	(0.91)	(1.00)	(0.82)	(1.22)	(1.11)
t (df)	-1.83 (82)		1.10 (80)		-1.08 (76)	
p	.07		.28		.28	
Expressive Suppression						
M	3.99	3.89	4.02	4.10	4.13	3.84
(SD)	(1.39)	(1.37)	(1.27)	(1.33)	(1.34)	(1.25)
t (df)	0.31 (82)		-0.27 (80)		1.00 (76)	
p	.76		.79		.32	
DERS						
M	3.69	2.46	2.58	2.51	2.78	2.69
(SD)	(0.60)	(0.55)	(0.54)	(0.58)	(0.57)	(0.69)
t (df)	1.87 (82)		0.53 (80)		0.12 (76)	
p	.07		.60		.90	

Table 2: Condition Means for Six Sequencing Condition and T-Test Results

Condition	Positive Emotion	Negative Emotion	Cognitive Reappraisal	Expressive Suppression	DERS
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Sandwich (PCP)	2.89 (0.61)	3.61 (0.81)	4.78 (1.07)	3.95 (1.37)	2.59 (0.59)
Constructive First (CPP)	2.21 (0.63)	3.30 (0.87)	4.95 (0.92)	4.06 (1.29)	2.55 (0.56)
Positive First (PPC)	2.18 (0.60)	3.33 (0.90)	4.72 (1.17)	3.97 (1.29)	2.70 (0.63)
Control (No Feedback)	2.41 (0.66)	3.30 (0.97)	5.09 (0.89)	3.93 (1.07)	2.69 (0.62)

Table 3: Condition Means for Collapsed Conditions and Control Condition

H1: Testing the Effects of Feedback Sequencing on Negative Emotion

We first examined the condition means for the three collapsed experimental groups. H1 predicted that the sandwich feedback condition would produce lower levels of negative emotion compared to other feedback sequencing conditions while controlling for emotion regulation variables (i.e., cognitive reappraisal tendencies, expressive suppression tendencies, difficulties in emotion regulation).

To explore the effects of sequencing on motivation, then, we ran a linear regression in which the effects of feedback sequencing on motivation was examined. First, we examined correlations among emotion and emotion regulation variables (see Table 4). Next, we dummy coded the collapsed feedback sequencing conditions into three groups: (1) Sandwich; (2) Positive first; and (3) Constructive first where the sandwich condition was the reference category. In the model, we controlled for possible confounding variables including cognitive reappraisal tendencies, expressive suppression tendencies, and difficulties in emotion regulation.

	Positive Emotion	Negative Emotion	Cognitive Reappraisal	Expressive Suppression	DERS
Positive Emotion	1.00	-.04	.22*	.13*	.002
Negative Emotion	-.04	1.00	.07	-.05	.31*
Cognitive Reappraisal	.22*	.07	1.00	-.04	-.25*
Expressive Suppression	.13*	-.05	-.04	1.00	.22*
DERS	.002	.31*	-.25*	.22*	1.00

Note. * denotes significance at p > .05.

Table 4: Correlations Among Emotion and Emotion Regulation Variables

The overall regression model was statistically significant (Adj. R^2 = .13, $F(6, 274) = 7.06$, $p <$ .001). However, in our model, we did not find an effect for the feedback sandwich (Constant: B = 2.59; SE = .38; Constructive First: B = -0.01, β = -0.01, p = .94); Positive First: B = -0.05, β = -0.03, p = .69, Control: B = .08, β = .04, p = .51.

We did, however, identify an effect for emotion regulation tendencies (Cognitive reappraisal: B = .14, β = .23, $p < 0.01$; Expressive suppression: B = -.09, β = -.13, p = .03). Difficulties in emotion regulation did not have an effect on negative emotion B = .55, β = .38, $p <$ .001). Therefore, H1 was not supported; the feedback sandwich did not lead to lower levels of negative emotion compared to other feedback conditions while controlling for emotion regulation tendencies and difficulty in emotion regulation.

H2: Testing the Effects of Feedback Sequencing on Positive Emotion

We first examined the condition means for the three collapsed experimental groups. H2 predicted that the sandwich feedback condition would produce higher levels of positive emotion compared to other feedback sequencing conditions while controlling for emotion regulation variables (i.e., cognitive reappraisal tendencies, expressive suppression tendencies, difficulties in emotion regulation).

To explore the effects of sequencing on motivation, then, we ran a linear regression in which the effects of feedback sequencing on motivation was examined. First, we dummy coded the collapsed feedback sequencing conditions into three groups: (1) Sandwich; (2) Positive first; and (3) Constructive first where the sandwich condition was the reference category. In the model, we controlled for possible confounding variables including cognitive reappraisal tendencies, expressive suppression tendencies, and difficulties in emotion regulation.

The overall regression model was statistically significant (Adj. R^2 = .08, $F(6, 274) = 4.03$, p = .001. However, in our model, we did not find an effect for the feedback sandwich (Constant: B = 1.32, SE = .28; Constructive First: B = -.10, β = -.08, p = 0.27; Positive First: B = -.10, β = -.07, p = .30; Control: B = .08, β = .04, p = .51).

We did, however, identify an effect for emotion regulation tendencies (Cognitive Reappraisal: $B = .14$, $\beta = .23$, $p < 0.01$; Expressive Suppression $B = .07$, $\beta = .14$, $p = .02$). Difficulties in emotion regulation did not demonstrate an effect on positive emotion ($B = .03$, $\beta = .03$, $p = .70$).

Therefore, H2 was not supported; the feedback sandwich did not lead to higher levels of positive emotion compared to other feedback conditions while controlling for emotion regulation tendencies and difficulty in emotion regulation.

Discussion

Although it seems plausible that feedback sequencing would impact emotional outcomes, the present study finds little evidence for this possibility. So, while in theory the method seems likely to lead to positive outcomes, in practice, insofar as emotional experiences go, the technique falls short. Discrepancies between results of the current study and articles in the popular press regarding the effectiveness of the feedback sandwich point to the importance of empirical research used to test arguments appearing the popular press.

The scant number of studies conducted on feedback sequencing, and more specifically the sandwich method, suggest that while the feedback sandwich may influence cognitive-level variables (i.e., student perceptions of the usefulness and effectiveness of the sandwich method), the effects of the method end there. The limited number studies conducted on instructor feedback sequencing and receiver perceptions suggest that the feedback sandwich method increases receiver judgements related to the usefulness and effectiveness of feedback than other sequences of feedback (e.g., Davies & Jacobs, 1985). However, subsequent studies have failed to find that the method leads to improved performance (e.g., Prochazaka et al., 2020) and emotional outcomes (Dolan et al., 2021). The current study further corroborates that the sandwich method may not be a major factor leading to positive educational outcomes, namely emotion regulation.

Taken together, results from the current study in combination with the larger body of research suggest that perhaps researchers should focus their attention on variations of feedback other than sequencing in their pursuits of understanding how instructors may effectively regulate their students' emotions through feedback on class assessments.

However, it might not be worthwhile to discount feedback sequencing all together. It may be the case that our experimental inductions were not strong enough to detect effects. For instance, it may be the case the sandwich method may be a useful tool for consistent feedback across a period of time. The current study looked only at a single instance of delivering feedback. Ideally, a longitudinal study would be able to examine the effects of repeated feedback.

Participants were also provided with little context about the class (e.g., the title of the class), which may also make a difference. Other factors that may have contributed to our inability to detect effects may include the channel of feedback (written verbal); it may be the case that spoken verbal feedback would produce a different pattern of results. Another factor to consider would be whether that verbal feedback is given publicly or privately to students.

Conclusions

Although the current study does not provide evidence that the feedback sandwich method has leads to higher levels of positive emotion and lower levels of negative emotion within student recipients, there is still much work left to do in this area. It may be the case that feedback sequencing affects cognitive, motivational, emotional, and behavioral variables through a less direct path than was originally assumed. Future work should consider these possibilities.

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