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Teacher Nonverbal Immediacy and Student Perceived Learning: The Mediating Role of Student Emotional Experiences

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Abstract: Educational psychologists are increasingly recognizing the influence of emotions on student learning outcomes. Research suggests that positive emotions help facilitate the processing and retention of information, encouraging approach behaviours that increase student learning. Online surveys from 131 students at the University of Guelph-Humber were used to explore: the direct and indirect relationships between teacher nonverbal immediacy (TNI); student emotional experiences of enjoyment, hope, pride, anger, anxiety, hopelessness, shame, and boredom in the classroom; and student perceived learning. Three validated questionnaires, the Perceived Nonverbal Immediacy Behaviour Scale, Achievement Emotions Questionnaire, and Revised Learning Indicators Scale were used to measure each variable respectively. Bias-corrected bootstrap confidence intervals were used as a modern, computationally-intensive mediation analysis with the capacity to control type I error rates while providing increased statistical power over more traditional analyses. Results demonstrated that TNI significantly predicted student emotional experiences during lectures for all participants, though TNI only had a significant indirect effect on student perceived learning for female students. These findings suggest teacher communication behaviours influence students' perceptions of learning by altering their emotional experiences within the classroom.

Keywords*:* Teacher; student; Nonverbal Immediacy; Perceived Learning; Emotional Experience

Current studies have increasingly noted an interconnection between teacher communication, student emotional experiences and student learning that has been generally overlooked by past research (Titsworth, Quinlan, & Mazer, 2010). There is a plethora of research analyzing how teacher nonverbal immediacy (TNI), the body language cues teachers portray, influences students' perceptions of learning (Witt, Wheeless & Allen, 2004). However, there is relatively little research that analyzes the specific emotions students experience in the academic environment, and how they may mediate the relationship between TNI and perceived student learning.

Teacher Nonverbal Immediacy

Immediacy was first conceptualized by Mehrabian (1969) who described it as a variety of "communication behaviours that enhance closeness to and nonverbal interaction with another" (as cited by Baringer & McCroskey, 2000, p. 178). While initially proposed as a consequence of feeling fondness towards an individual, other researchers have argued immediacy can be used as a tool to facilitate learning in the classroom because it decreases the psychological distance between instructors and the students they teach (Baringer & McCroskey, 2000). Researchers describe teacher nonverbal immediacy (TNI) as a variety of behaviours that increase psychological closeness between communicators including eye contact, facial expressions, tone of voice, posture and movement (McCroskey, Sallinen, Fayer, Richmond, & Barraclough, 1999; Pogue & AhYun, 2006).

There is a significant amount of research regarding how TNI influences emotional experiences within the classroom. TNI has been found to be strongly associated with: student affective,

cognitive, and perceived learning (Allen et al., 2006; Witt et al., 2004); cognitive and emotional interest (Mazer, 2013); student engagement (Mazer, 2013); attendance (Rocca, 2004); motivation to learn and perceived instructor fairness (Kerssen-Griep & Witt, 2012); perceptions of being mentored (Griep & Witt, 2015); emotional valence and support and decreased emotional work (Titsworth et al., 2010); decreased negative influence of verbal aggressiveness, increased state motivation, positive classroom climate, and teacher credibility (Mazer, 2016); student evaluations of professor teaching (Babad, Babad, & Rosenthal, 2004) and increased state motivation and communication satisfaction (Myers, Goodboy & Members, 2014). There is a large amount of research on how TNI can positively influence a variety of student learning outcomes, highlighting its important role in the classroom.

Student Emotionality

There has been considerable research on how emotional experiences can influence student learning outcomes. Horan and colleagues (2012) used self-report measures from 266 students to test whether pleasure, arousal, and dominance were associated with student learning outcomes. Their results found that, when combined into one variable, pleasure, arousal, and dominance significantly predicted cognitive learning (Horan et al., 2012). However, when analyzed separately, only pleasure significantly predicted cognitive learning. Similar evidence was provided regarding affective learning, as only pleasure and arousal were significant predictors. In contrast, their findings concerning state motivation suggested pleasure, arousal, and dominance were all significant predictors.

Research has also analyzed whether general feelings of emotional support, emotional work, and emotional valence predict student learning outcomes (Titsworth et al., 2010). Titsworth and colleagues (2010) define emotional support as feelings of teacher availability and willingness to talk about topics relating to school, emotional work as the extent of emotional labor and suppressing emotions in the class, and emotional valence as the general view of positivity or negativity towards the classroom (Titsworth et al., 2010). Their results demonstrated that nonverbal immediacy significantly predicted emotional valence and emotion work, but not emotional support. In turn, they found that higher emotional support, emotional valence, and decreased emotional work were significantly associated with affective learning, motivation, and learning indicators.

Research by Titsworth and associates (2013) used self-report data from 752 students to analyze how enjoyment, pride, and hope are influenced by TNI. Their results suggest that TNI significantly decreased the amount of emotional work students demonstrated, which in turn was a significant predictor of pride, hope and enjoyment (Titsworth et al., 2013). In other words, higher TNI decreased the amount students felt they had to hide their emotional responses in class, increasing their pride, hope, and enjoyment. Supporting this conclusion, the analyses made by Titsworth and colleagues (2013) demonstrated that TNI had significant indirect relationships with student enjoyment, hope, and pride.

Mazer and associates (2014) analyzed how negative emotions can be influenced by TNI using self-report measures from 753 students. Paralleling previous research (Titsworth et al., 2010; Titsworth et al., 2013) they found TNI was significantly associated with emotional work, which

was a significant predictor of anger, anxiety, shame, hopelessness, and boredom (Mazer et al., 2014). These results provide further evidence that emotional work mediates the relationship between TNI and student emotions. Also supporting the previous literature, TNI had a significant, though indirect, relationship with student anger, anxiety, shame, hopelessness, and boredom (Mazer et al., 2014).

Integrating the results from previous studies, it is clear that TNI influences both student emotionality (Titsworth et al., 2010) and specific student emotions (Mayer et al., 2014; Titsworth et al., 2013) albeit with other moderating variables. Moreover, evidence suggests that student emotionality is related to perceived and cognitive learning (Titsworth et al., 2010), and there is a significant overlap between student emotionality and specific student emotions (Titsworth et al., 2013; Mayer et al., 2014).

Perceived Learning

Student perceived learning is a self-report measure of the amount of learning a student believes they have accumulated from one class (Frymier & Houser, 1999). It contrasts cognitive learning, which is defined as a direct measurement of student learning through tests and examinations (Chesebro, 2003). Several authors (Campbell, 2014; Mazer & Graham, 2015; Witt et al., 2004) note that some studies (i.e. Baringer & McCroskey, 2000) operationalize cognitive learning through student self-reported knowledge measures such as Richmond and associates (1987) Learning Loss, and other tests that ultimately measure perceived learning rather than cognitive learning. For example, Witt and colleagues (2004) noted that the correlation between TNI and

the perceived learning measure was much higher (r =.51) in comparison to the lower (r =.017) correlation between TNI and cognitive learning.

Empirical evidence in the literature provided the rationale for several hypotheses in the current study. First, it was hypothesized that TNI would be significantly correlated with eight emotions students experience during lecture, and the eight emotions would be correlated with student perceived learning. Second, it was hypothesized that TNI would have a significant indirect effect on perceived learning when experiences of positive and negative emotions during lecture were analyzed as mediating variables.

Methods

Participants

131 undergraduate students from the University of Guelph-Humber and Humber college participated in this study. The sample consisted of 91 females (69.5%) and 40 males (30.5%). The ages ranged from 18 to 31, with a mean of 20.21 (SD = 2.38). Students had a variety of majors with the majority in psychology ($n = 40$), followed by business ($n = 26$), kinesiology (n = 19), justice studies (n = 18), media studies ($n = 14$), early childhood education (n = 6), and family and community social services ($n = 5$), with three participants not reporting their major.

Design

This study utilized questionnaires to analyze the relationships between TNI, student emotional experiences, and perceived learning. Due to the lack of experimenter manipulation, this study was correlational in nature. The variables that were focused on include: teacher nonverbal

immediacy; specific student emotions such as enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom; and student perceived learning. The independent variable was TNI, the mediating variable was student emotions, and the dependent variable was student perceived learning.

Regarding TNI, this study measured the students' reports of teacher nonverbal immediacy behaviours such as smiling, gesturing, having an open body posture, and fluctuating vocal tone across all the lectures they have currently experienced with the teacher. Emotionality was broken down into two subcomponents, involving how students experience enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom during lectures (Pekrun et al., 2011). Perceived learning was measured by a self-report inventory regarding how much students engage in actions and thinking styles that demonstrate learning from the course. Examples include explaining course content to classmates and thinking about classroom discussions outside the classroom (Frymier & Houser, 1999).

Materials

One observer report questionnaire and two self-report inventories were used to measure the three major variables of this study: TNI, student emotions, and perceived learning. All three questionnaires utilized have excellent reliability and validity, making them useful measurement tools. The 10-item Perceived Nonverbal Immediacy Behavioural Scale (McCroskey et al., 1996) was used to measure TNI. A modified version of the Achievement Emotions Questionnaire (AEQ) developed by Pekrun and colleagues (2011) was used to measure specific student emotions. The original AEQ measures eight emotions experienced in the classroom, while

studying, and while writing tests, with a total of 24 items. Due to the timeframe the study was conducted, the test-related emotions component were removed because the majority of students had not written a test in their course by the time of data collection. Finally, the 7-item Revised Learning Indicators Scale (Frymier & Houser, 1999) was used to measure student perceived learning.

In addition to the latest SPSS software, an add-on to SPSS titled PROCESS was used for the mediation analyses. PROCESS is used for "statistical mediation, moderation, and conditional process analysis", providing an opportunity to conduct more detailed mediation analyses than provided by the default SPSS software (Hayes, 2016, p. 1). The current study utilized version 2.16 of PROCESS, which was downloaded at www.processmacro.org.

Procedure

The survey asked students to answer questions based on any class they are currently registered in, where they interact with a professor in person. The online questionnaires were completed between February 6th and February 13th. An information letter and written consent were provided online through Qualtrics. The participants had to read the information letter and "sign" the written consent form online at the very beginning of the survey before they could continue.

After participants provided an electronic signature, they filled out three demographic questions involving age, gender, and major. They then completed the three questionnaires for a total of 37 questions. Upon completion, participants were provided a debrief form online through Qualtrics.

Statistical Analysis

This study applied correlation and mediation analyses to explore the research question. The preliminary correlation analyses compared how the experience of each emotion within the classroom related to TNI and perceived learning. Bias-corrected bootstrap confidence intervals with samples ranging from 5000 to 10000 were utilized to analyze the hypothesis that TNI indirectly influences student perceived with emotional experiences during lecture as a mediating variable.

A review of the literature regarding optimal statistical measures for mediation analyses revealed a consensus that bootstrap confidence intervals tend to be the best option to maximize statistical power while controlling for type I error (Biesanz, Falk, & Savalei, 2010; Hayes, 2009; Titsworth et al., 2013; Zhao, Lynch & Chen, 2010). Hayes (2013) notes that in cases where "there is an indirect effect…the bias-corrected bootstrap CI is more likely to lead to the correct decision than any other method, regardless of sample size" (p. 1924). TNI was hypothesized to have an significant indirect effect on perceived learning, so there was a strong rationale for choosing bias-corrected bootstrap confidence intervals as the primary method of data analysis for the hypothesis.

Results

Relationships between TNI, Students' Emotions, and Perceived Learning:

Due to evidence that male and female students' emotional experiences in the classroom differ (Pekrun et al., 2011), the correlational analyses were split by gender (refer to tables 1.1 and 1.2). For male participants, there was a significant relationship between every emotion experienced

during lecture and TNI. Anger (r = -.61, p <.01), boredom (r = -.56, p <.01) and hopelessness (r = -.52, p <.01) all had strong correlations with TNI. The only emotion that was significantly correlated with perceived learning was pride (r = .32, p <.05), which was also the only emotion that had a moderate correlation with perceived learning for men.

Table 1.1: Correlations for Male Students

Emotions During Lecture	TNI	Perceived Learning
Enjoyment	.337*	.266
Hope	.473**	.210
Pride	.413**	.324*
Anger	-.611**	-.062
Anxiety	-.482**	.156
Shame	-.340*	-.254
Hopelessness	-.516**	-.017
Boredom	-.561**	-.137

*Correlation is significant at the 0.05 level.

**Correlation is significant at the 0.01 level.

Table 1.2: Correlations for Female Students

Emotions During Lecture	TNI	Perceived Learning
Enjoyment	.495**	.417**
Hope	.502**	.417**
Pride	.509**	.485**
Anger	-.465**	-.360**
Anxiety	-.461**	-.415**
Shame	-.227*	-.056
Hopelessness	-.452**	-.324**
Boredom	-.487**	-.404**

*Correlation is significant at the 0.05 level.

**Correlation is significant at the 0.01 level.

Paralleling results for men, every emotion experienced during lecture was significantly correlated to TNI for women. Contrasting male students, the emotions with the strongest relationship to TNI were positive emotions like pride (r = .51, p <.01), hope (r = .50, p <.01), and enjoyment (r = .50, p <.01). Contrary to results for men, female students' emotions during lecture all had significant relationships with perceived learning except for shame (r = .06, p >.05); this is different than the finding for male students, for whom only pride was significantly related. Diverging from the male sample, TNI had a significant relationship with perceived learning for female students (r = .25, p <.05). However, the size of the correlation between these

variables for the three analyses only differed by 1%, so the differences in significance may represent the differences in sample sizes.

Emotional Experiences as Mediating Variables: Four bootstrap mediation models were used to explore the hypothesis that TNI has an indirect effect on student perceived learning when emotional experiences during lecture are accounted for as a mediating variable. Each model used TNI as the independent variable, emotional experiences during lecture as the mediating variable, and student perceived learning as the dependent variable.

The first (N = 10000) and second (N = 5000) bootstrap mediation analyses measured data from male participants with TNI as the independent variable, student emotions as a mediating variable, and perceived learning as the dependent variable. The results demonstrated that TNI was a significant predictor of both positive (b = .46, SE = .14, p <.01) and negative (b = -.72, SE = .13, p <.01) emotional experiences during lecture. Paralleling the correlational results, TNI had stronger predictive power for negative emotions than positive emotions for male students. Inconsistent with the hypothesis, neither positive (b = .30, SE =.20, p >.05) nor negative (b = .11, SE =.22, p >.05) emotional experiences during lecture were significant predictors of perceived learning. Accordingly, the indirect effect of TNI on perceived learning for both positive (b = .26, SE = .18, 95% CI = -.09─.62, p >.05) and negative (b =.26, SE =.18, 95% CI = -.09─.62, p >.05) emotions during lecture were not significant. Thus, the first hypothesis was not supported for either positive or negative emotional experiences when only accounting for male students.

Figure 1. Mediation Results for Male Students

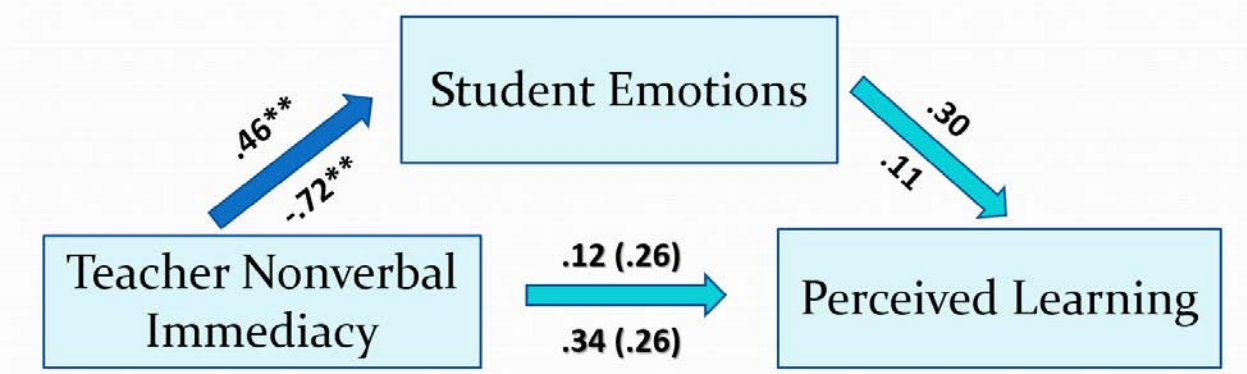

Figure 1. Results from the mediation model for male students (hypothesis 2a). The numbers above the arrows refer to positive emotions while the lower numbers refer to negative emotions. The figure shows standardized regression coefficients, and asterisks and dark blue lines demonstrate a significant pathway (p <.05*, p < .01**). Bracketed coefficients denote an indirect effect.

The third and fourth bootstrap mediation models paralleled the first and second in terms of variables, but only utilized data from female students. For this population, the models (N = 5000) demonstrated that TNI was a significant predictor of both positive (b =.53, SE =.08, p <.01) and negative (b = -.48, SE =.08, p < .01) emotional experiences during lecture. Results also found that experiencing positive (b = .60, SE = .13, p < .01) and negative (b = -.42, SE =.13, p <.01) emotions predicted perceived learning scores. Consistent with the mediation hypothesis, the direct effect of TNI on perceived learning was not significant (b = .05, SE= .12, p > .05). Instead, the indirect effect of TNI on perceived learning was significant for both positive (b =.25, SE =.10, 95% CI = .05—.46, p < .05) and negative (b= .25, SE = .10, 95% CI = -.29—.16, p <.05) emotional experiences during lecture.

For female students, TNI significantly predicted both positive and negative emotions, which in turn significantly predicted perceived learning. Regarding the direction of the relationships, higher levels of TNI were associated with higher levels of positive emotions and decreased levels

of negative emotions. Increases in positive emotions were related to higher levels of perceived learning, while increases in negative emotions were associated with decreases in perceived learning for female students. For women, hypothesis 1 was fully supported; TNI indirectly effected perceived learning with positive and negative emotions as full mediators for this population.

Figure 2. Mediation Results for Female Students

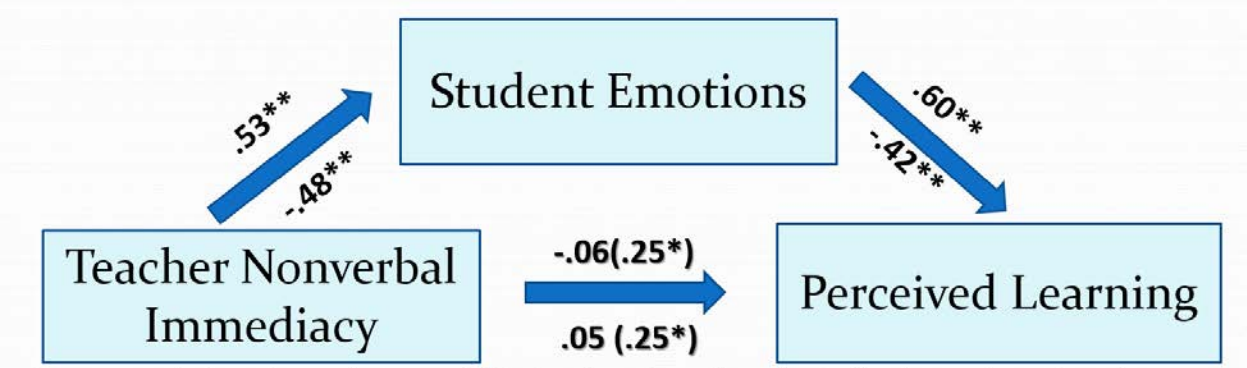

Figure 2. Results from the mediation model for female students (hypothesis 2b). The numbers above the arrows refer to positive emotions while the lower numbers refer to negative emotions. The figure shows standardized regression coefficients, and asterisks and dark blue lines demonstrate a significant pathway ($p < .05^*$, $p < .01^{**}$). Bracketed coefficients denote an indirect effect.

Discussion

Evidence from the current study suggests that there is a significant relationship between teachers' body language during lecture and the emotions students experience in the classroom. High levels of TNI, such as eye contact, gestures, fluctuating vocal tone, and open body language, are associated with increases in both male and female students' experiences of enjoyment, hope and pride, and decreases in anger, anxiety, hopelessness, shame and boredom during lectures. For women, emotional experiences within the classroom significantly predict self-reported learning, causing TNI to have a significant, indirect effect on perceived learning; this result was not statistically significant for male students.

The finding that TNI significantly predicted students' emotional experiences within the classroom coincides with other research analyzing TNI and student emotions (Kelly, Rice, Wyatt, Ducking, & Denton, 2015; Mayer et al., 2014; Pouge & AhYun, 2006; Titsworth et al., 2010; Titsworth et al., 2013; Witt et al., 2004), and is well supported within the literature. The findings from the current study corresponds with existing knowledge, while building upon the literature by noting a direct relationship between TNI and all eight of the emotions measured.

The gender differences noted in the mediation analyses were a novel finding in contrast to the majority of the literature. Three different studies concluded that teacher communication patterns significantly influence students' emotions and learning outcomes for all students (Mayer et al., 2014, Titsworth et al., 2010, Titsworth et al., 2013). However, all three of these studies had datasets where two thirds of the participants were female. The authors of these studies did not split their analyses by gender, nor did they report using invariance tests to ensure male and female participants had relatively similar responses. In light of the results from the current study, it is questionable whether the results of some previous studies can be generalized to both male and female students.

There is substantial evidence that males and females have different emotional experiences and emotional awareness within the classroom, which may explain the gender-discrepant results of the current study. For instance, research suggests that women report more enjoyment and anxiety but less anger within the classroom (Pekrun et al., 2011). It has also been shown that female graduate students are more likely to experience higher emotional demands than male students (Zembylas, 2008) and women tend to experience more negative emotions within the classroom

(Chiang & Liu, 2014). Furthermore, there is evidence indicating that women have significantly better emotional intelligence than men (Cabello, Sorrel, Fernández-Pinto, Extremera, & Fernández-Berrocal, 2016). The current literature provides little insight into the gender-discrepant findings noted in this study, so further research is required to validate and investigate these results.

Limitations

The correlational nature of this study limits the potential of these results to lead to causal inferences. For example, there is the potential that students have a predisposition towards experiencing certain emotions within learning environments, which then influence those students' perceptions of TNI.

A further limitation of this study was its inability to capture the full complexity of interpersonal communication within the classroom. Interpreting the results to suggest a linear, unidirectional relationship between TNI and the emotions students experience in the classroom would be an oversimplification of a complex ecological system (Bronfenbrener, 2005). Although this study noted a significant relationship between TNI and the emotions students experience in the classroom, other researchers have found that the nonverbal immediacy behaviours that *students* portray significantly predicts the emotions teachers feel towards those students (Baringer & McCroskey, 2000). On a similar note, higher levels of teacher involvement lead to more student motivation, but students who show higher engagement are more likely to receive more teacher involvement and support (Skinner & Belmont, 1993). Teachers and students reciprocally influence one another.

Future Research

The results and limitations of the current research provide several characteristics future research should address. Future analyses should implement an experimental design that can provide more support to causal claims than the current study (for example, see Pouge et al., 2006). The present study also only measured students' perceptions of learning, which prevented this study from making generalizations to cognitive learning (Chesebro, 2003). Consequently, future research should manipulate TNI in a simulated classroom setting and include cognitive learning measures like test scores and GPA to provide a more thorough analysis.

Practical Implications

The results from this study provide two practical suggestions to facilitate positive learning experiences for both teachers and students. First, teachers are encouraged to do their best to maximize their use of nonverbal immediacy when teaching by smiling, making eye contact with all students, gesturing, using vocal fluctuations, moving around the class, and having an open body posture. Second, acknowledging the relationship between emotions and perceived learning, teachers should consider how their actions can influence these emotions in students. Instructors can facilitate pride and hope by demonstrating recognition for students' work and providing positive feedback (Pines, Larkin, & Murray, 2016). As evidenced in this study, communication patterns, emotional experiences, and perceived learning are interconnected. Both teachers and students are encouraged to maximize positive emotional experiences within the classroom to create an ideal environment that facilitates student success.

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Conflict of Interest: Chris Baron declares that he has no conflict of interest.

Ethical Approval: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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