The Role of Fairness and Basic Psychological Needs in Understanding Dyslexic Students' Emotions in Classroom Assessment

Lia M. Daniels*
University of Alberta

Lauren D. Goegan
University of Manitoba

Patti C. Parker
Thompson Rivers University

Post-secondary students with learning disabilities like dyslexia experience a wide range of emotions related to classroom assessment, perhaps in part because assessment may feel unfair and undermine principles related to wellbeing. To mitigate negative emotions, researchers tend to focus on teaching students how to cope with test anxiety and exam stress or encouraging instructors to improve assessment formats. These approaches, however, do not attend to the psychological experience of assessment. The purpose of this study was to examine associations amongst perceived fairness, three basic psychological needs, and six discrete emotions in the domain of classroom assessment. Results of a parallel multiple mediator analysis showed that perceptions of fairness were positively associated with psychological need satisfaction. In turn, satisfaction of competence and autonomy were related to students' emotions; whereas, relatedness was not. We describe specific recommendations for supporting students' wellbeing in assessment with particular attention to nuances for students with dyslexia.

Keywords: **learning disabilities, dyslexia, student wellbeing, psychological needs**

INTRODUCTION

The lay discourse around summative assessments that are used to assign grades tends to focus on anxiety, pressure, and grades more so than enjoyment, opportunity, and learning. Although pleasant emotions like pride and hopefulness can be associated with assessment, the empirical literature affirms that students are more likely to focus on negative emotions such as anxiety or anger in assessment experiences (Pekrun et al., 2004). To mitigate these emotions, researchers tend to focus on either the characteristics of an assessment that can give rise to emotions, such as high stakes tests, pop quizzes, and feedback or on how students can individually cope with negative emotions. There are, however, many psychological connections that occur in between deciding on a specific format of an assessment and teaching students to cope that are rarely leveraged. One such under studied connection is through self-determination theory and the satisfaction of basic psychological needs (BPN; Ryan & Deci, 2017). Because psychological need satisfaction is associated with wellbeing

*Please send correspondence to: Lia M. Daniel, Educational Psychology Department, University of Alberta, Education Centre-North 8730 - 112 St NW, Edmonton AB, T6G 2G5, Canada, Email: lia1@ualberta.ca.

(Ryan & Deci, 2017), the more BPNs are satisfied in the context of assessment then arguably the more pleasant emotions and fewer negative emotions students should experience regardless of the format of the assessment.

Despite the potential of BPNs to enhance student wellbeing in the domain of assessment, an understanding of these connections for post-secondary students is generally lacking (Daniels et al., 2021; Deci & Ryan, 2016). For post-secondary students with learning disabilities such as dyslexia, the omission is even more striking because assessment research tends to focus on ensuring adequate accommodations to document fair conditions to support their best performance (Lindstrom, 2007; Weis et al., 2016) rather than its psychological experience. Fairness, however, is socially constructed (Tierney, 2013; Rasooli et al., 2018) and thus it is impossible for an instructor to know for certain that accommodations and assessments will be viewed as fair by the student. By extension, particularly for students with dyslexia, it is possible that a perception of assessment as fair is a necessary prerequisite to be able to perceive psychological need satisfaction and experience more pleasant than unpleasant emotions in regards to assessment. Thus, the purpose of this study was to examine these psychological constructs for post-secondary students with dyslexia thereby expanding researchers' and administrators' understanding of assessment experiences beyond accommodations.

Dyslexia

Of the various learning disabilities represented in post-secondary students, students with dyslexia are the largest subgroup (Richardson, 2021). Rooted in neurobiology related to language processing that manifests primarily in word level reading difficulty (Kearns et al., 2019), students with dyslexia report difficulties with phonological awareness, working memory, and processing speed in ways that require a greater investment of effort in school (Hatcher & Colleagues, 2002). Although the challenges cut across all aspects of schooling, when it comes to assessment at post-secondary specifically, students with dyslexia report additional challenges in seeking extensions and accommodations, managing academic workloads, and preparing for tests, assignments, essays, and labs, and combating high levels of stress and anxiety (Lambert & Dryer, 2018; McGregor et al., 2016; Richardson, 2021). To be more specific, workload, for example, may be difficult for students with dyslexia to manage because completing reading assignments will take longer for them than other students because of the behavioral topography of dyslexia. Given that self-determination theory offers mechanisms to mitigate these psychological difficulties and increase wellbeing, we chose to use it as our guiding framework in this research.

Self-Determination Theory

Within self-determination theory (SDT; Ryan & Deci, 2017), we employed the sub-theory of Basic Psychological Needs (BPN). According to this sub-theory, there are three needs that are essential for an individual's wellbeing, and these needs can either be supported or frustrated by the environment (Ryan & Deci, 2017). Autonomy refers to feeling that one can act in alignment with personal choices and interests. Competency involves feeling one is capable when engaging in an activity. Lastly, relatedness is one's sense of connection or belonging to others around them

(Vansteenkiste et al., 2020). Basic psychological needs are theorized to be satisfied when instructors undertake a number of actions such as giving choice, providing rationales, taking students' perspectives, and accepting emotions (Reeve & Cheon, 2021). Extensive research has found that when classroom learning environments satisfy students' BPNs, they experience enhanced wellbeing as indicated through pleasant emotions, self-efficacy, engagement, and satisfaction (Goegan et al., 2023; Vansteenkiste et al., 2020). Although this statement is true for classrooms in general, research on BPN satisfaction in the context of assessment specifically is just beginning to emerge and has rarely considered the perspectives of students with dyslexia.

Recognizing this omission, Daniels et al. (2021) argued that "researchers encourage teachers to support basic psychological needs through their instruction, but do not explicitly extend the principles to assessment" (p. 112-113). To bring descriptive data to bear on their claim, they surveyed 200 undergraduate students and showed that no single type of assessment strongly satisfied undergraduate students' BPN, with quizzes and multiple-choice exams being particularly low. Additionally, satisfaction for the need of relatedness, which was operationalized as feeling "supported by their instructor," was consistently the least satisfied by all forms of assessments. Continuing this line of investigation, Goegan et al. (2023) used a multi-method study and found that when students with learning disabilities completed classroom assessments that they perceived as supporting their BPNs, they experienced better learning outcomes including higher grades and a greater perception of success. From an SDT perspective more generally, Cho and colleagues (2021) showed that self-determined motivation was positively associated with adaptive beliefs about assessment and self-regulatory learning strategies. However, no researchers have connected BPN in assessment with students' emotions.

Emotions, Fairness, and Assessment

Few would disagree that the experience of summative assessment, as in assessments that contribute grades, can be very emotional. For better or worse, summative assessments are the means to earn good grades, avoid probation, prove distinction, gain admission to competitive programs, and win prestigious scholarships (National Research Council, 2011) – all of which are highly valued outcomes worthy of emotional responses. Thus, although test anxiety was the main focus of attention for decades (Zeidner, 1998), the study of discrete emotions related to assessment has greatly expanded (Pekrun et al., 2004). In their landmark paper, Pekrun and colleagues (2004) built on the control-value theory of achievement emotions (Pekrun, 2006) to show qualitatively and quantitatively that joy, hope, and pride, relief, anger, anxiety, shame and hopelessness are emotions regularly experienced before, during, and after exams (see also Spangler et al., 2002). In a general sample of students, Reeve et al. (2014) reported that before an exam university students feel moderate levels of positive and negative activating emotions followed by higher pride and relief than anger or shame following an exam. Daniels (2020) showed that immediate test scores increase hope, pride, and relief but only for university students who were satisfied with their score on the exam. For students who were unsatisfied, regardless of their actual percentage score, anger and shame increased after receiving their score immediately while hope, relief and pride decreased.

Similar patterns have been noted for specific groups of students as well. For example, Goetz and colleagues (2007) found important differences in emotions depending on students' abstract reasoning ability. Specifically, enjoyment during an exam was most prominent in students with high reasoning; whereas, anger and anxiety were predominant for students with lower reasoning. Sainio et al. (2019) showed that students with reading difficulties felt less hope and more anxiety related to literacy than their peers without such difficulties (Sainio et al., 2019). Recently, in a systematic review, Fong and Soni (2022) found that students with LD experienced higher levels of test anxiety about school when compared to their non-LD peers. Moreover, they identified test conditions and perceptions of support as relevant factors related to test anxiety. Like many others, Fong and Soni focused on the testing environment, format, and sources of support in eliciting emotions. As students interact with these specifics of assessment, they may come to view assessment as being generally fair or unfair and that too many be linked to how well assessment can satisfy BPNs.

Although the scholarly definition of fairness is ever-evolving (Tierney, 2013; Rasooli et al., 2018) the sense of assessment as unfair is well known and often reported by students (Chory et al., 2017; Rasooli et al., 2019a). Importantly, fairness is increasingly recognized as a socially constructed experience that differs according to students' personal identities and histories (Tierney, 2013), meaning that although there are principles to guide the design of fair assessment (e.g., Rogers, 1985), there is no guarantee students will interpret assessments as such. This may make the emotional experience of fairness particularly relevant as students cognitively appraise assessment. Rasooli and colleagues (2019a) used a critical incident open-ended survey technique and found that Iranian university students' descriptions of fair assessment generated feelings of happiness, satisfaction, feeling valued, and hopefulness; whereas, feelings of anger, being upset, disappointment, and embarrassment accompanied unfair assessment incidents.

While all students are entitled to fair assessment experiences, students with learning disabilities such as dyslexia have an additional element of fairness to manage in the form of legislated rights to access accommodations (Rasooli et al., 2021). Examples of assessment accommodations include modified questions, extended time, access to large print or reading aids, and private settings (Reinschmiedt et al., 2013). Accommodations are designed to allow students equal opportunity to demonstrate their learning by removing barriers; however, there is substantial variability in the extent to which students are satisfied with accommodations, experience barriers to access, and report improved performance (Cawthon & Cole, 2010; Harrison et al., 2022; Trammell, 2003). Rasooli and colleagues (2021) identified the following four themes describing how students with disability, their teachers, and parents considered fair assessment: overall conception of fairness, fair practices, fair socio-emotional environment, contextual fairness. It is possible that fairness holds an important role in how students' with dyslexia conceptualize assessment and the extent to which it can hold a role in satisfying BPNs.

The Current Study

The literature suggests an important link between a perception of assessment as fair and student emotions (Rasooli et al., 2019b). Likewise, according to

self-determination there is theoretical reasoning to suggest that emotions will be improved if assessments are able to satisfy students' BPNs – characteristics that transcend the specific format of an assessment. Thus, this study is guided by the following conceptual framework as applied specifically to students with dyslexia (Figure 1). In the conceptual framework, BPNs hold the role of mediator, meaning that they will explain the associations between fairness and emotions. In statistical terms, through a parallel multiple mediator model (Coutts & Hayes, 2022), we expected (1) a perception of assessment as fair would be positively associated with satisfaction of each BPN and (2) BPN satisfaction would be positively associated with the three pleasant emotions and negatively associated with the unpleasant emotions. Thus, we expect indirect effects whereby perception of assessment as fair will be associated with emotions through BPN satisfaction. This work makes an important contribution by focusing specifically on BPN satisfaction and emotions in the domain of classroom assessment. Moreover, by focusing on psychological elements of assessment in a sample of university students with dyslexia we prioritize the human and social factors in assessment (Brown & Harris, 2016) beyond the right to accommodations.

Figure 1. **Conceptual Model linking Fairness to BPN Satisfaction and Assessment Emotions**

METHOD

We used a single-administration survey to collect data from students with dyslexia on fairness, basic psychological need satisfaction, and discrete emotions. As depicted in Figure 1, these constructs were examined statistically through a parallel multiple-mediator model (Coutts & Hayes, 2022) that allowed us to focus on the role of satisfaction of each BPN relative to the others on emotions. Ethics approval was obtained from the Human Ethics Research Office.

Procedures

We used Prolific[(C)] to distribute our survey to eligible participants. Prolific is an online data collection platform that allows researchers to recruit "custom samples from a pool of 120,000+ active, vetted, and engaged participants" (Prolific, 2022). To be eligible for the study, the individual had to be listed and verified in Prolific as (a) 18 years or older, (b) registered as a student at a postsecondary institution, and (c) self-identified as a person with dyslexia. Individuals who met the inclusion criteria were sent a link to the online survey. The items specific to this study were embedded

in a larger survey that took about 45 minutes to complete[1]. Consent was implied by the completion of the online survey. A total of 100 slots were open for participants and data collection was completed in less than 12 hours with no missing data. Participants were compensated for their time based on the guidelines provided by Prolific (Prolific, 2021).

Participants

Seventy-one men, 27 women, and 2 non-binary students participated. This ratio reflects the typical sex distribution with the incidence of dyslexia approximately three times higher in men than women (Arnett et al., 2017). Participants ranged in age from 18 to 46 ($M = 21.67$, $SD = 4.11$). The majority of participants identified their program as undergraduate ($n = 64$) with fewer students being in graduate programs ($n = 32$). Four participants did not indicate a type of program. In terms of year of study, 26 participants were in their first year, 22 in their second, 26 in their third, 14 in their fourth, and 12 in their fifth year or higher. Lastly, participants were registered in a variety of faculties including Arts, Business, Education, Engineering, Graduate Studies, Law, Science, and Social Sciences.

Measures

Demographics

Participants responded to five demographic items including gender, age, student status, year of studies, and Faculty, which we used to describe the sample.

Perceptions of Fairness

Participants responded on a Likert scale from 1 (strongly disagree) to 5 (strongly agree) to a single item asking their overall perception of fairness: "classroom assessment practices are fair to students." Although fairness is a multifaceted construct, we chose to use this single item for its directness and because overall fairness has been shown as relevant to students with learning disabilities (Rasooli et al., 2021). Descriptive information is presented in Table 1.

Basic Psychological Needs Satisfaction

To assess the extent to which participants perceived their assessment experiences satisfied their BPNs, we adapted a 9-item measure developed by Filak and Sheldon (2003). The original items were reworded to focus specifically on assessment. Three items assessed each of the BPN of autonomy (e.g., I have a lot of input in the assessments used in my classes; McDonald's $\omega = .56$), competence (e.g., the types of assessment my classes allow me to show my learning; McDonald's $\omega = .50$), and relatedness (e.g., instructors design assessments in a way that shows they care about me; McDonald's $\omega = .70$). Participants responded on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). To create the subscales, the items were summed and averaged with higher scores indicating stronger agreement. The

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1   The full survey was designed to mimic an interview and involved participants describing instances their basic psychological needs were satisfied or frustrated by assessment practices. The quantitative indicators included in the current study followed the main study and were intended to be analyzed separately.

McDonald's reliability coefficients for the adjusted scales were lower than expected indicating a need to do more psychometric work on scales specific to BPN satisfaction in the domain of assessment.

Emotions

Participants were provided with the prompt: "Assessment can induce different feelings. The following questions refer to emotions you may have experienced when engaging in assessment practices at university". Then, participants were asked to respond to six single items reflecting the three pleasant emotions of enjoyment, pride, and relief (I enjoy working on assessments for my courses; I am proud of the assessments I complete; After finishing assessments for my courses, I feel relief) and the three unpleasant emotions of anxiety, anger, and hopelessness (I get anxious about assessments in my courses; I get angry about assessment practices in my courses; I feel like giving up when it comes to assessment). Single item measures of emotions have functioned adequately in research with university students (Gogol et al., 2014).

Rationale for Analysis

We conducted our analyses in two steps. First, as preliminary analyses, we ran descriptive statistics and correlations for all study variables. Second, we ran a parallel multiple mediator path analysis in JASP (JASP, 2022). Given the focal point on BPN, our main interest was to test for direct and indirect effects from fairness through autonomy, competence, and relatedness satisfaction, to the six discrete emotions. For completeness, we also report on the total effects, although these associations are not the main focus on the research questions. This design allowed us to determine if any specific BPN was dominant (Coutts & Hayes, 2022).
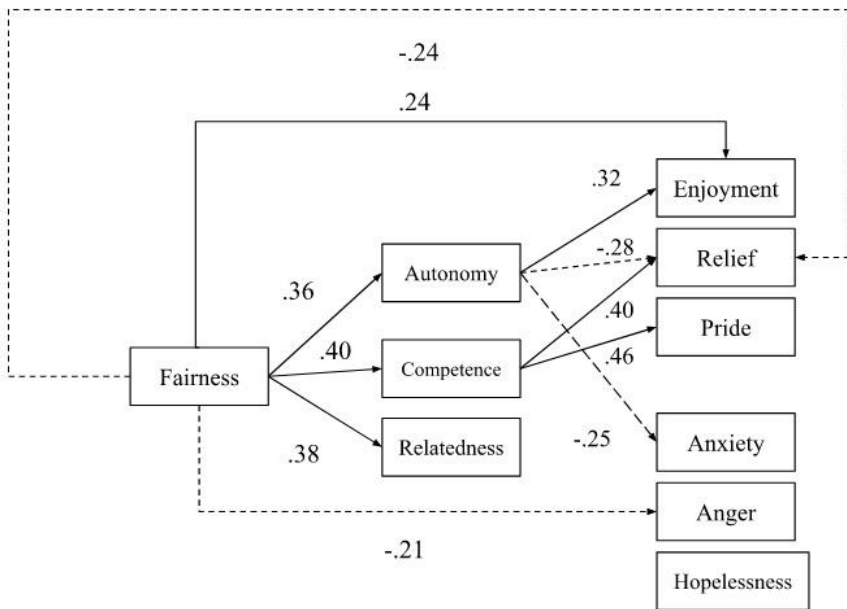
Results

In terms of mean level endorsement, participants rated positive and negative emotions similarly and slightly above the midpoint of the scale. The most strongly endorsed emotion was relief which was also more skewed and kurtotic than the other emotions. The least strongly endorsed emotion was hopelessness, which was below the scale midpoint. Students also scored about neutral on the 5-point scale for autonomy and competence satisfaction through assessment. Of the three, relatedness was the least strongly endorsed BPN. Fairness was significantly positively correlated with all three BPN. As evidence of validity for the single item emotion measures, all three negative emotions were positively correlated and they were negatively correlated with enjoyment. The associations for pride and relief were less consistent, perhaps indicating that these emotions can differ depending on if they occur in response to success or failure. Neither pride nor relief correlated with fairness. Importantly, BPNs correlated with the positive and negative emotions in the expected directions providing a foundation for examining indirect effects.

Table 1. Descriptive Statistics and Correlations

Variable	1	2	3	4	5	6	7	8	9	10
1. Fairness										
2. Autonomy	.45***									
3. Competence	.51***	.51***								
4. Relatedness	.48***	.57***	.59***							
5. Enjoy	.52***	.52***	.46***	.40***						
6. Pride	.12	.17	.39***	.18	.44***					
7. Relief	-.15	-.13	.20*	.08	-.01	.28**				
8. Anxious	-.34**	-.38***	-.29**	-.33***	-.36***	-.06	.31**			
9. Anger	-.38**	-.24*	-.29**	-.37***	-.22*	-.13	.09	.25*		
10. Hopeless	-.30**	-.24*	-.39***	-.38***	-.30**	-.36***	-.07	.33***	.37***	
M	2.80	3.05	3.39	2.62	3.24	3.83	4.32	3.88	3.15	2.97
SD	1.25	0.90	0.78	0.87	1.04	1.08	.94	1.11	1.12	1.22
Skewness	.16	-.36	-.27	.001	-.24	-.82	-.158	-.73	-.04	.06
Kurtosis	-.89	-.52	-.12	-.78	-.56	.13	2.32	-.49	-.87	-.93

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

The results of the mediation analyses are presented in Figure 2 including the total variance explained for each emotion. As suggested by the zero-order correlations, students' perception of assessment fairness was positively associated with satisfaction of each of the three BPNs with standardized ß = .36 explaining 21% of the variance in autonomy, ß = .40 explaining 21% in competence, and ß = .38 explaining 23% in relatedness. Fairness also retained direct associations with two emotions: positive with enjoyment ß = .24 and negative with anger ß = -.21. The zero-order relationships amongst fairness and anxiety and hopelessness were suppressed in the mediation model and a negative direct association emerged with relief ß = -.24. Satisfaction of autonomy was positively associated with enjoyment of assessment ß = .32 and negatively associated with both relief ß = -.28 and anxiety ß = -.25. Satisfaction of competence had positive associations with both relief ß = .40 and pride ß = .46. Interestingly, satisfaction of relatedness was unrelated to the emotions and neither hopelessness nor anger were associated with need satisfaction.

Note. Only statistically significant associations *p* < .05 are included. Solid lines represent positive associations, dotted lines represent negative associations.

Figure 2. **Standardized Beta Weights for the Mediation Path Model**

Resulting from combinations of these statistically significant direct effects, five indirect effects were statistically significant with confidence intervals based on 500 bootstrap estimates. First, fairness exerted a significant positive indirect effect on enjoyment through autonomy satisfaction, ß = .11, *p* = .008, [CI Range .03 to .20].

Second, fairness exerted a significant positive indirect effect on pride through competence satisfaction, ß = .18, p = .001, [CI Range .07 to .30]. Third, fairness exerted a significant positive indirect effect on relief through competence satisfaction, ß = .16, p = .004, [CI Range .05 to .27]. Fourth, fairness also exerted a significant negative indirect effect on relief through autonomy satisfaction, ß = -.10, p = .03, [CI Range -.19 to -.01]. Fifth, fairness exerted a significant negative indirect effect on anxiety through autonomy satisfaction, ß = -.09, p = .047, [CI Range -.18 to -.001].

      Total effects in a parallel multiple mediator model are calculated by adding all direct and indirect effects. Thus, total effects can be non-significant when the combinations of direct and indirect effects involve different signs essentially canceling each other out. Alternatively, total effects can become significant when the combinations of several direct and indirect effects that were not statistically significant on their own cross the threshold. Evidence of both of these situations exists in these results (Table 2). As would be expected based on the direct and indirect effects, the total effect of fairness on enjoyment, anxiety, and anger are all statistically significant. The total effect for relief is not statistically significant because the opposing signs on the direct and indirect effects negate each other. The total effect for pride is also not statistically significant despite a significant indirect effect through competence suggesting other non-significant paths were in the opposite direction. Finally, the total effect of fairness on helplessness is statistically significant resulting from the cumulation of negative indirect effects through competence and relatedness that approached but did not reach statistical significance on their own but do in combination.

Table 2. *Total Effects of Fairness on Emotion Outcomes*

Predictor		Outcome	Estimate	SE	z-value	p	95% CI Lower	95% CI Upper
Fairness	→	Enjoyment	0.420	0.068	6.164	< .001	0.286	0.553
Fairness	→	Pride	0.103	0.079	1.302	0.193	-0.052	0.257
Fairness	→	Relief	-0.131	0.080	-1.636	0.102	-0.287	0.026
Fairness	→	Anxiety	-0.281	0.075	-3.767	< .001	-0.428	-0.135
Fairness	→	Hopelessness	-0.246	0.076	-3.245	0.001	-0.394	-0.097
Fairness	→	Anger	-0.304	0.074	-4.103	< .001	-0.450	-0.159

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

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DISCUSSION

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We tested a parallel multiple mediator model (Coutts & Hayes, 2022) in which satisfaction of autonomy, competence, and relatedness in the domain of classroom assessment were theorized to mediate the link between overall perceptions of fairness and emotions specific to a sample of college students with dyslexia. This is the first quantitative study to pair psychological need satisfaction in the domain of assessment with emotions in any student group. We discuss three major findings contextualized to students with dyslexia and their implications for research and practice. First, we comment on the consistent associations amongst a perception of assessment as fair and satisfaction of each BPN. Second, we discuss the role of autonomy and competence satisfaction in supporting adaptive emotions in a way that satisfaction of relatedness did not. Third, we contrast the potential for BPN satisfaction in the domain of assessment to improve pleasant emotions relative to their ability to decrease negative emotions and discuss unique emotions. We offer several limitations and directions for future research.

A Perception of Assessment as Fair

In this sample, 41% of participants disagreed or strongly disagreed that in general assessments are fair to students compared to 28% who agreed or strongly agreed. This descriptive statistic affirms that students with dyslexia still perceive that they encounter unfair assessment practices despite the legal accommodations to which they are entitled (Rasooli et al., 2021). Although we did not explicitly ask students about their current accommodations, the results suggest that the personal and psychological element of fairness may not be fully mitigated by accommodations. This is an important distinction that the literature supports. On the one hand, focusing on a specific format of assessment, Ricketts and colleagues (2010) concluded that there were no empirical differences in medical students' multiple-choice exam scores between those who were and were not accommodated, suggesting fairness can be empirically documented. On the other hand, Rasooli and colleagues' (2021) highlight complex perceptions of fairness that are broader than specific practices and Ofiesh and colleagues (2004) document a wide range of perceptions of fairness regarding extra time accommodations at post-secondary.

Importantly these perceptions of fairness appeared to be a prerequisite to BPN satisfaction in the domain of classroom assessment for dyslexic students. Each BPN was uniquely positively associated with perceptions of fairness. Previous research has shown fairness to be associated with constructs similar to BPNs such as students' motivation for learning (Chory-Assad, 2002), relationships with instructors (Rasooli et al., 2019a), and both shallow and meta-cognitive study strategies (Cho et al., 2021). Given that other research shows that typical students tend to report fairly low BPN satisfaction from assessment (Daniels et al., 2021), the connection with fairness becomes an important advancement. Common recommendations for BPN satisfaction do not explicitly mention fairness (Reeve, 2016), perhaps because the recommendations have been more strongly rooted in instructional practices rather than assessment. As such, an important step forward in consideration of how to satisfy BPN in the domain of assessment explicitly is to follow recommendations for fair assessments. There are various principles to guide the creation of fair assessment

practices including factors such as type and frequency of assessment, consistent scoring procedures, and clear communication of results (e.g., Scott et al., 2014; Rogers, 1985). However, because fairness in assessment is socially constructed and can differ across students' identities and histories (Murillo & Hidalgo, 2017; Rasooli et al., 2018; Rasooli et al., 2019b; Tierney, 2013), crossing principles for fairness with recommendations for BPN satisfaction may prove to be particularly fruitful.

Satisfaction of Autonomy and Competence more Important than Relatedness

As was the case for typical students in Daniels et al. (2021), the students with dyslexia in this sample reported fairly low BPN satisfaction attached to assessment with the need for relatedness the least satisfied of the three with an average score below the midpoint of the scale. This means there is substantial room to better satisfy all BPNs in assessment for students with dyslexia, but particularly relatedness. While our results point to fairness as an important consideration in satisfying relatedness, self-determination theory offers many additional evidence-based suggestions (Reeve & Cheon, 2021) that can be made relevant to classroom assessment. Drawing on Daniels et al., (2021), instructors could support relatedness before assessment by providing explanatory rationales so that students can understand the reason for a specific assessment format or timing. During assessment, instructors could create calm testing environments and welcome students to take time to breath and relax before beginning. After an assessment is completed, instructors can take students' perspectives when it comes to being ready for feedback and make space to work through any negative emotions. In practice, these types of strategies may satisfy all three BPN even though they were selected to help enhance relatedness. Some research has suggested social integration akin to relatedness is particularly important for students with learning disabilities at post-secondary (Goegan & Daniels, 2020) making the extension of these principles to assessment practices explicitly all the more relevant. All of these ideas require empirical verification even though similar practices are highly effective when enacted as a form of instruction (Reeve & Cheon, 2021).

In terms of associations with emotions in assessment, satisfaction of autonomy and competence were more important than relatedness, even though relatedness is highly valued by teachers (Patall et al., 2023). First, pride was associated with a satisfaction of competence. According to Attribution Theory students feel pride when success is attributed to internal causes (Graham, 2020). Within this, it is also possible to distinguish authentic pride which is experienced following effort from hubristic pride which is predicated on ability. Generally, students with learning disabilities tend to focus on their need to exert greater effort than their peers (Goegan et al., 2021) in order to feel competent, so it would be interesting to determine if hubristic pride is relevant to this group of students. Second, anxiety and enjoyment were oppositely related to the satisfaction of autonomy. As such, providing students with choice and control in regards to assessment could be an important contribution to reducing anxiety and increasing enjoyment regardless of the specific format of assessment. Some ways to do this may include aligning learner outcomes with assessments in a generous rather than narrow way, giving students choice within an assessment, and allowing students to choose how they would like to access feedback (Daniels et al., 2021). Similar recommendations have often been advanced for students with learn-

ing disabilities through the Universal Design for Learning (UDL) guidelines (CAST, 2018), that highlight "optimiz[ing] individual choice and autonomy." More specifically, the guideline clarifies that students will differ in how much and the types of choice they need. By adding a SDT perspective to UDL researchers and instructors may view practical elements of choice in light of their psychological contribution to need satisfaction.

Negative Emotions and Relief

We had expected parallel results between BPN satisfaction and the positive and negative emotions. However, this was not the case. Instead, it seems that satisfaction of BPN in assessment may create more of an opportunity to enhance positive emotions like enjoyment and pride than to reduce negative emotions like anger and hopelessness, the exception being anxiety. We offer a few explanations for these unbalanced effects. First, we asked students to indicate their emotions for assessment generally rather than focusing on a specific assessment experience or event. Because emotions are linked to cognitive appraisals of specific outcomes (Pekrun, 2006) this lack of specific prompt may have made it difficult for students to report strong negative emotions such as anger and hopelessness. Alternatively, students with dyslexia may simply be accustomed to working harder than their peers and may have learned to manage these types of emotions (Goegan et al., 2021). Second, it will be important to differentiate between need satisfaction and frustration or thwarting. Vansteenkiste, Ryan, and Soenens (2020) explain:

> the reason for treating need frustration as a distinct notion is that it involves an active threat of the psychological needs (rather than a mere absence of need satisfaction). These two experiences … stand in an *asymmetrical* relation to each other, as the absence of need satisfaction does not necessarily imply the presence of need frustration, whereas the presence of need frustration denotes the absence of need satisfaction (p. 9).

It is possible that need satisfaction is able to help increase the pleasant emotional experience associated with assessment, but that thwarting factors may perpetuate negative emotions like anger and hopelessness. It will be important in future research to consider how assessment frustrates or thwarts satisfaction of basic psychological needs in order to avoid specific practices as much as to endorse others. Regardless, the increase of pleasant emotions we noted through BPN satisfaction is in keeping with intrinsic motivation and wellbeing and may help offset negative emotions even if it does not reduce them directly.

Finally, relief was the most complicated emotion in terms of associations with fairness and BPN because it was negatively associated with autonomy and positively associated with competence while also directly negatively associated with perceptions of fairness. It is important to note that Pekrun (2006) classifies relief as a deactivating emotion that occurs when anticipated failure is avoided. As such, it is possible some of these associations reveal students' relief when the conditions of the assessment may allow an external attribution should failure occur. For example, students could choose to blame an unfair assessment for their poor performance thereby experiencing relief that the failure was not their fault. Pekrun and colleagues' (2014)

experimental study on anticipated feedback showed that relief was predicted by both mastery-approach and performance-avoidance goals showing that both adaptive and maladaptive beliefs can be related to relief. Generally, however, relief is an understudied emotion and one that certainly requires more attention in relation to assessment practices and students with dyslexia.

Limitations, Future Research Directions, Conclusions

The results of this study should be interpreted with consideration of four limitations. First, as mentioned in the methods section, the measures of internal consistency for BPN satisfaction in assessment were lower than expected. It is possible that some of the error is related to using horizontal rather than vertical response indicators, which can be challenging for individuals with dyslexia and we recommend that researchers heed recommendations for ways to accommodate research participation (Goegan et al., 2018). In order to continue research in this area it will be important to undertake a specific psychometric study to ensure the items and scales are sufficiently robust to support the inferences. Such a study may begin with qualitative interviews or focus groups with students to clearly understand how students experience autonomy, competence, and relatedness in the domain of assessment. These results could be used to generate a large pool of questionnaire items to use as the basis of think-aloud sessions (Leighton et al., 2017) as researchers narrow the items down to the most meaningful for students. Second, participants self-identified as being an individual with dyslexia. While there have been some concerns raised that students do not want to self-identity due to potential stigma more broadly, other research has found self-identification to be an effective way for identifying individuals with learning disabilities (McGonnell et al., 2007). Because we were not concerned with how the specifics of a dyslexia diagnosis interacted with the variables, we are satisfied with the process the Prolific platform uses to vet participants (Prolific, 2022) according to an extensive list of demographic factors. Third, the survey did not ask participants to report any details about the course, instruction, assessment practices, sources of perceived fairness, or their accommodations. Although we argue throughout that a focus on BPN satisfaction transcends assessment specifics, it would be interesting to consider these connections in future research. In regards to fairness, specifically, it will be important to explore differences between courses in which assessment practices are perceived as more or less fair as well as to further delve into differences between a general belief that assessment is unfair compared to students' particular experiences of unfairness - neither of which were possible with the current fairness item. Fourth, we chose to run a parallel multiple mediator model on correlational data meaning we had no time separation between the variables and instead the logic of the model is predicated solely on theoretical assertions. We recognize this is a contested methodological issue (Agler & DeBoeck, 2017; Tate, 2015) and suggest that future research consider longitudinal or experimental designs to disentangle these effects. Nonetheless, we were careful to avoid any causal language in the presentation of our results and encourage readers to remember that the directions of these associations are inconclusive.

In conclusion, the results of this study show the connection between fairness, BPNs, and the emotions experienced by dyslexic students related to course assess-

ment. Assessment is an emotional component of students' education, and satisfaction of one's need for autonomy, competence, and relatedness can support students in feeling more positive emotions and reducing anxiety which is one of the most targeted emotions when it comes to assessment. Moreover, it remains important to recognize that accommodations are not the only relevant perspective from which to consider assessment for students with learning disabilities like dyslexia. Combining self-determination theory, models of fairness, and principles of UDL could create a synergistic approach to enhancing the wellbeing of students with dyslexia in regards to assessment.

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