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Constructing mathematical bitterness scale related to teacher factor

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Abstract

Mathematical bitterness is one of the critical factors influencing students' mathematical performance, highlighting the need for further action to address its impact. However, there has been no instrument thus far that can identify mathematical bitterness, particularly one caused by teacher treatment. This research, therefore, aims to construct an instrument to identify the presence of mathematical bitterness. This research involved 307 senior high school and undergraduate students, who were given and responded to a set of 30 questions. The data were then analyzed using confirmatory factor analysis (CFA) through IBM SPSS 20. Confirmatory factor analysis grouped the items into six dimensions (indicators) of mathematical bitterness. Each indicator shows a high Cronbach Alpha result, indicating strong validity in each group of indicators. Overall, the constructed instrument demonstrates strong validity and reliability. This instrument has been successfully constructed and statistically tested, thus making it readily available for use by other scholars interested in investigating mathematical bitterness on a broader scale.

Keywords: factor analysis; instrument; mathematical bitterness; quantitative; teacher

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Introduction

A number of research studies have proven that mathematics presents unique challenges for both teachers and students. One possible explanation for this is the perception that math is difficult. Several studies confirmed this notion (Amirali, 2010; Hannula et al., 2005), arguing that math learning leads to increased math anxiety (Luttenberger et al., 2018) and poor math learning outcomes (Rizta & Antari, 2018). Math is also often perceived negatively by students and society in general as a rigid and complicated subject (Hayati & Ulya, 2018; Picker & Berry, 2000). In fact, the majority of students worldwide express a dislike for math (Amirali, 2010; Hazimah & Sutisna, 2023) because it creates the occurrence of negative emotions (Gafoor & Kurukkan, 2015b). Similarly, Scarpello argues that the main factor that causes students' dislike of math is mathematics anxiety, which stems from students' unpleasant past classroom experiences (2007).

One factor that triggers students' dislike of math is teacher treatment. Students, for example, received unpleasant treatment from math teachers at their respective schools (Amirali, 2010; Dirgantoro & Soesanto, 2021; Gafoor & Kurukkan, 2015b). A study by Larkin and Jorgensen states that the context of teachers' unpleasant treatment not only refers to teachers' lack of ability to create a conducive learning atmosphere but also to the 'abuse' perpetrated during teaching (2015). To be more specific, the physical and verbal abuse carried out by teachers leads to the development of negative memories, resulting in various outcomes such as math anxiety (Luttenberger et al., 2018) and poor math performance (Rizta & Antari, 2018). If this situation happens for a long time, it can further lead to what is commonly called 'math bitterness'. To say it another way, students with math bitterness are more likely to experience difficulty in grasping the materials, affecting their learning outcomes. In light of this situation, assessing the phenomenon of math bitterness in mathematics education then becomes crucial.

Regarding the concept of math bitterness, a prior preliminary study had been conducted by the researchers, which resulted in definitions and indicators for math bitterness. Math bitterness is defined as a negative perception towards math caused by the accumulation of past experiences that affect students' responses towards math, self, and math teachers (Dirgantoro et al., 2023). The indicators of math bitterness are 1) having experienced unpleasant treatment from a mathematics teacher for a prolonged period, 2) having a negative view of mathematics, 3) feelings of incapability in the subject of mathematics, 4) viewing the mathematics teacher as unfriendly, 5) poor performance in mathematics, and 6) having high mathematical anxiety (Dirgantoro et al., 2023).

The research, however, does not stop simply at developing definitions and indicators of math bitterness. A valid and reliable instrument is needed to identify the presence of math bitterness. Indeed, when teachers recognize students struggling with math bitterness, they can find and deploy strategies to assist them in overcoming it. By providing appropriate assistance, it is hoped that students will find math enjoyable, leading to improved learning outcomes.

However, to this day, there has not yet been any instrument found to identify math bitterness. As follow-up research, this study, therefore, aims to create a tool and/or an instrument to identify math bitterness related to teacher factors through statistical analyses. This

instrument is expected to support further researchers interested in investigating a math bitterness phenomenon related to teacher factors in their respective contexts, particularly in the post-pandemic era.

Methods

Research participants

This research included 307 participants, consisting of senior high school students (25.74%, N = 79) and undergraduate students (74.26%, N = 228), with ages ranging from 14 to 33. We selected the participants from senior high school and undergraduate level due to the adequacy of their experiences in mathematics learning. In terms of gender representation, there were 85 male participants (27.69%) and 222 female participants (72,31%), all of whom had prior experience learning math in their respective schools. Table 1 below provides further details about the participants' demographics.

Table 1. Students' demographics (N = 307)

Aspect	Detail	N	%
Gender	Males	85	27.69
	Females	222	72.31
Origin	Nias	27	8.79
	Sumatra	114	37.13
	Java	77	25.08
	Bali	3	0.97
	Kalimantan	31	10.10
	Sulawesi	29	9.46
	Nusa Tenggara	16	5.21
	Maluku	6	1.95
	Papua	4	1.31
Senior High School Grade (N = 79)	Grade 10	32	40.51
	Grade 11	8	10.13
	Grade 12	39	49.36
Undergraduate (N = 228)	Freshmen (1st year)	126	55.26
	Sophomores (2nd year)	47	20.61
	Juniors (3rd year)	20	8.77
	Seniors (4th year)	34	14.92
	More than four years	1	0.44

Research procedure

This quantitative research aims to construct an instrument to measure or assess math bitterness conducted through statistical analysis. A series of procedures were followed to produce a valid and reliable construct. Figure 1 below shows the stages that were conducted by the researchers.

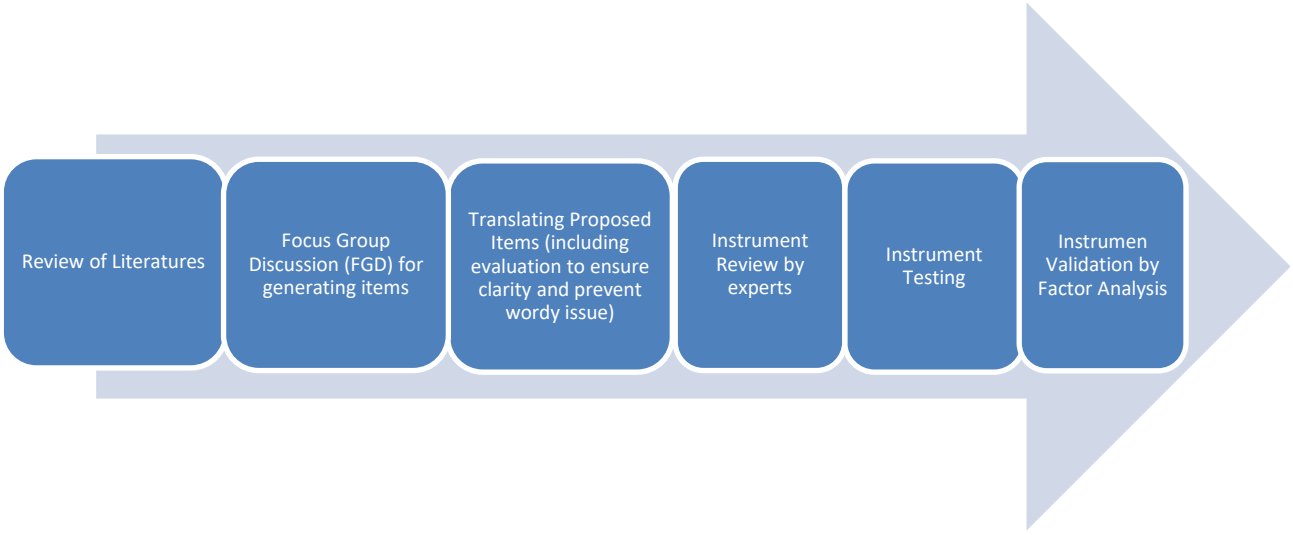


Figure 1. Research procedure

Research instrument

The research team developed the research instrument by formulating statement items based on the six indicators of math bitterness associated with teacher factors: (1) having experienced unpleasant treatment from a mathematics teacher for a long time, (2) having a negative view of mathematics, (3) feeling untalented in mathematics, (4) viewing the mathematics teacher as unfriendly, (5) poor mathematics learning performance, and (6) having high mathematical anxiety (Dirgantoro et al., 2023). For each indicator, the research team then constructed five statement items, resulting in a total of 30 items. Throughout the item development process, the research team discussed how to intentionally construct the items correctly. After the 30 items were agreed upon, the team contacted the three reviewers - two with expertise in counseling and one with expertise in math education. This team of reviewers then reviewed each item regarding its content, language, and grammar. After the results from reviewers were received, the research team then had a further discussion on revising the items according to the feedback from reviewers. Table 2 shows examples of items after revisions.

Table 2. Evaluation process of the instrument (sample items)

Before	Feedback	After
Math teachers were often intimidating, resulting in a tense classroom atmosphere. .	It is not appropriate; the word 'intimidate' can be multi-interpretative. For respondents, this word may have a connotation with the words 'physical abuse, verbal abuse, comparing with other students, the negative label,' which already is present in other questions.	Math teachers often create a tense classroom atmosphere.
I often want to stay away from my math teachers.	Be more specific, such as what kind of action 'stay away' from the teachers, whether they are outside the class or	I often want to avoid my math teachers.

Before	Feedback	After
	inside; is it when skipping math class or when bumping into teachers outside of the class, the students tend to avoid or like what	
None of my math teachers appreciate my learning effort.	Using the word 'none' may make it difficult for students to decide because it means that all teachers do not appreciate students' effort in learning. If directed to the Likert scale, the answer would be more likely to be two answers – strongly agree or strongly disagree. Because of the word 'none,' it is better to use the sentence, 'My math teachers often do not appreciate students' effort in learning.	My math teachers often do not appreciate students' effort in learning.

Prior to distributing the instrument to respondents, the instrument was transferred into a Microsoft Form questionnaire, which can be distributed fast and effectively. The sampling technique was conducted using quota sampling, as amount of 300 respondents. The questionnaire were distributed referring to the sampling size, until it fulfilled according to the size (Creswell, 2009). The first three questions of the questionnaire were related to demographics such as gender, city of origin, and grade or cohort. Meanwhile, the components addressing math bitterness consist of a total of 30 items presented in a Likert Scale format, which requires participants to respond by selecting from four options: 4 (strongly agree), 3 (agree), 2 (disagree), and 1 (strongly disagree). This Microsoft form remained accessible for two weeks to extend opportunities for respondent participation.

Data analysis technique

The collected data was then analyzed using statistical tests. The researchers used Confirmatory Factor Analysis (CFA) with IBM SPSS 20 to construct the instrument. CFA is chosen due to the existing theoretical foundation derived through literature review (Creswell, 2014); in this context, it is adopting and adapting the six indicators of math bitterness related to the teacher factor (Dirgantoro et al., 2023). CFA requires meeting two assumptions - *Kaiser-Meyer-Olkin Measure of Sampling Adequacy* (KMO-MSA) and *Bartlett's Test of Sphericity*. KMO-MSA needs to be examined to detect the similarity among items by observing indicators from its values, while *Bartlett's Test of Sphericity* pertains to the correlation among variables. The two assumptions are met if KMO is > 0.5, and the result of Bartlett's Test is < 0.05 to ensure correlation among variables. Furthermore, the researchers utilized the rotation *Varimax* method to distinguish between dimensions more effectively.

Results

Two assumptions had to be fulfilled before conducting the CFA analysis, that is, by observing the results of both KMO-MSA and Bartlett's tests. Table 3 shows that through the statistical analysis, the result of KMO is 0.943 (> 0.5), and the significant value on Bartlett's test is 0.000 (< 0.05). The two results indicate that the items are correlated and have similarities across multiple dimensions. Along with this result, CFA can continue with processing for the development of a mathematical bitterness instrument.

Table 3. KMO dan Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA)		0.943
Bartlett's Test of Sphericity	Sig.	0.000

Additionally, the MSA assumption needed to be fulfilled. The requirement is that the MSA score on each item should be > 0.5; only then can the next analysis proceed without removing the item used. Table 3 provides the MSA score, which summarizes the result of the Anti-Image correlation conducted through the Anti-Image matrices. Table 4 further shows that the 30 items fall within the range of > 0.5, indicating that none of the items needed to be removed.

Table 4. Anti-image correlation (MSA) score

Item	MSA	Item	MSA	Item	MSA	Item	MSA	Item	MSA
1	0.898	7	0.923	13	0.953	19	0.963	25	0.957
2	0.857	8	0.953	14	0.956	20	0.945	26	0.966
3	0.902	9	0.882	15	0.945	21	0.932	27	0.956
4	0.929	10	0.958	16	0.967	22	0.950	28	0.968
5	0.936	11	0.950	17	0.914	23	0.927	29	0.939
6	0.909	12	0.965	18	0.915	24	0.947	30	0.941

In addition, the communalities scores must be investigated, which are examined by observing the extraction score in each item. The criterion is that the extraction score must be > 0.50. If this requirement is fulfilled, it means that all the proposed items have a strong correlation with the focused problem. Table 5 shows that 30 items have an extraction score > 0.50, indicating that all the proposed statements have a strong correlation in measuring math bitterness.

Table 5. Communalities

Item	*Ext.	Item	*Ext.	Item	*Ext.	Item	*Ext.	Item	*Ext.
1	0.551	7	0.705	13	0.729	19	0.648	25	0.650
2	0.754	8	0.568	14	0.731	20	0.563	26	0.672
3	0.666	9	0.676	15	0.625	21	0.794	27	0.549
4	0.609	10	0.713	16	0.643	22	0.749	28	0.665
5	0.695	11	0.638	17	0.648	23	0.784	29	0.709
6	0.579	12	0.608	18	0.633	24	0.734	30	0.682

*Ext. = Extraction score

As explained before, the researchers refer to the six indicators of math bitterness formulated by the preliminary study. Hence, in the CFA implementation, the researchers did an

extraction that consisted of six factors. As described in Table 6, those six dimensions can explain 66.567% of the variation.

Table 6. Total variance explained

Extraction Sums of Squared Loadings		
Total	**% of Variance**	**% Cumulative**
11.902	39.674	39.674
3.298	10.994	50.669
1.464	4.880	55.549
1.356	4.519	60.068
1.109	3.698	63.766
1.017	2.801	66.567

Furthermore, the Scree Plot is conducted as displayed in Figure 2, which provides information about the number of factors formed, according to Eigenvalues. Referring to Figure 2, it can be viewed that there are 6 factors which have Eigenvalues > 1, so that means the instrument establishes 6 factors.

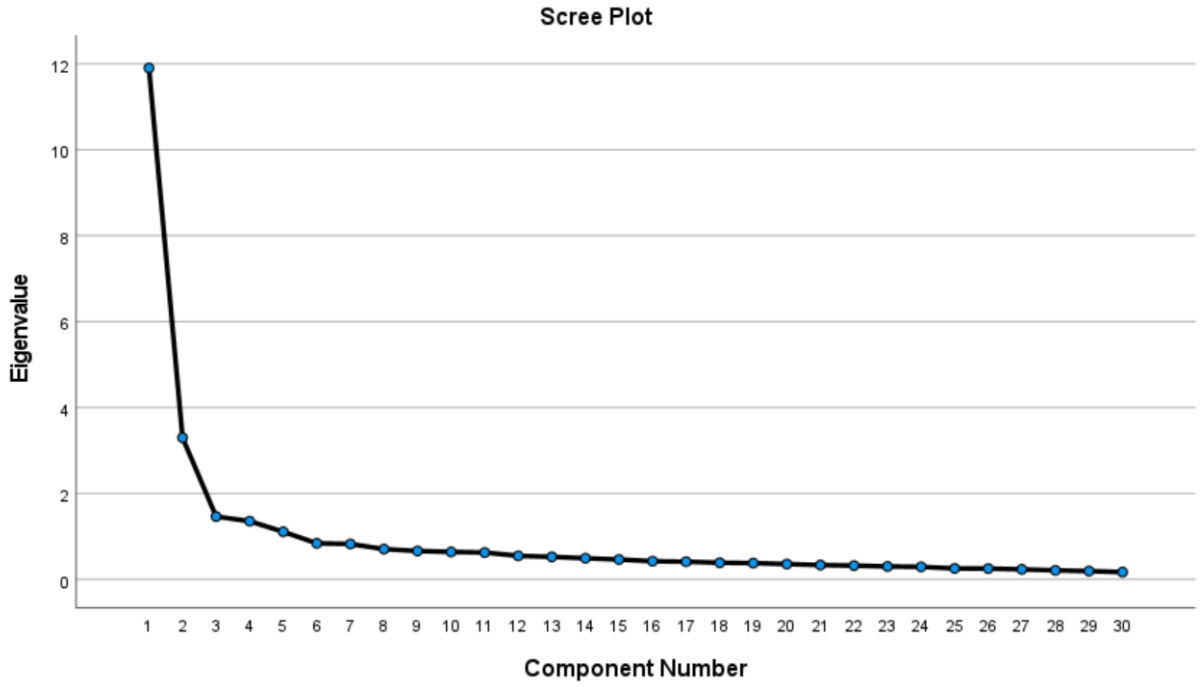


Figure 2. Scree plot graph

The next step is to observe how the CFA groups the items into six dimensions of mathematical bitterness. The grouping is observed based on factor loading values listed in the Rotated Component matrix. However, prior to that, the researchers wanted to ensure the factor loading score was > 0.32 (N = 307) because factor loading > 0.32 can be said to be consistent in that indicator. The value of 0.32 is determined based on the guidelines for identifying significant factor loadings based on sample size (Hair et al., 2019). According to the guidelines, researchers find that only several sample sizes are displayed. Referring to Hair's guideline table, a sample size 307 lies between N = 250 (factor loading = 0.30) and N = 350 (factor loading =

0.35). Hence, to find out the value of factor loading, the researcher used the calibration formula, which was:

$$\frac{N_x - N_1}{N_2 - N_1} = \frac{FL_x - FL_1}{FL_2 - FL_1}$$

By using the calibration formula, we input the value of $N_x = 307$, $N_1 = 250$, $N_2 = 350$, $FL_1 = 0.30$, $FL_2 = 0.35$. The researcher calculated the factor loading value according to the sample size and obtained a factor loading of 0.32. Finally, researchers elaborated on items which have been categorized into six dimensions representing the mathematical bitterness indicators, with the factor loading > 0.32. Table 7 provides the wrap-up of the Rotated Component Matrix. Since the factor loading value of each item were various, the items can still be included in the instrument as long as the items > 0.32 as the factor loading calibrated value.

Table 7. Items recapitulation based on 6 indicators of math bitterness.

Indicators	Items	Factor Loading	Cronbach Alpha
Having high mathematical anxiety	▪ I often feel stupid because I cannot understand Math.	0.678	0.888
	▪ I always feel disappointed with myself because I cannot do math questions.	0.691	
	▪ I often feel scared and nervous when I am studying math.	0.721	
	▪ Whenever I do a math test, my brain suddenly feels blank.	0.637	
	▪ I am so scared whenever I am asked to do math problems.	0.691	
	▪ I feel stressed out when I am having a math test.	0.716	
Poor performance in mathematics	▪ I often get below the passing grade scores in math tests.	0.831	0.909
	▪ I often get below passing grade scores for my math assignments.	0.777	
	▪ I often have to take remedial for my math class.	0.812	
	▪ My math score is the lowest in my school report.	0.730	
	▪ I have never gotten satisfactory math scores.	0.651	
Having experienced unpleasant treatment from a mathematics teacher for a prolonged period	▪ Math teachers frequently give me physical punishment (e.g., hitting, pinching, etc.).	0.707	0.829
	▪ Math teachers frequently scolded me with harsh words.	0.822	
	▪ Math teachers frequently compared me with other students.	0.794	
	▪ Math teachers often time created a tense classroom atmosphere.	0.622	
	▪ Math teachers often assign negative labels to me.	0.787	

Indicators	Items	Factor Loading	Cronbach Alpha
Viewing the mathematics teacher as unfriendly	▪ I often avoid my math teachers.	0.390	0.844
	▪ I perceive my math teachers as unsympathetic people.	0.624	
	▪ In my opinion, math teachers tend to be unfriendly.	0.626	
	▪ My math teachers are the teachers that I fear the most.	0.471	
	▪ My math teachers often do not appreciate my effort in learning.	0.637	
	▪ I often feel unwell (e.g., dizzy, nauseous) during math class.	0.517	
Having a negative view of mathematics	▪ My life will be happy, even without math.	0.579	0.759
	▪ Math is a useless subject for me.	0.391	
	▪ Math is a subject filled with many formulas that give me a lot of headaches.	0.362	
	▪ Math has a direct connection to my everyday life.	0.770	
	▪ Math is something that is scary for me.	0.336	
Feelings of incapability in the subject of mathematics	▪ I am sure that my talent is not in math.	0.344	0.796
	▪ No matter how much effort I put in, I will never be able to solve math problems.	0.565	
	▪ I quickly give up even before starting to learn math.	0.400	

Discussion

According to the statistically constructed indicators of math bitterness, math anxiety plays a significant role in determining the math bitterness phenomenon. One of the prevalent mental health issues across the globe is anxiety disorder. Within the educational sector, for instance, anxiety disorder has adverse effects on students. These anxieties manifest through feelings triggered by specific situations such as exams, the learning process, teacher factors, and other academic and skills-related problems. Moreover, students may also experience specific forms of test anxiety and performance anxiety related to particular subjects, with math anxiety being the most notable one (Luttenberger et al., 2018).

Math anxiety can be defined as feelings of apprehension and intensified physiological reactivities that usually occur when dealing with math, such as when students have to do numerical manipulation, solve math problems, or face a math test (Luttenberger et al., 2018).

In line with that, Jais et al. (2019) state that math anxiety is associated with feelings of pressure and nervousness, which disrupts one's abilities to manipulate numbers and solve general math tasks, whether in daily life or classroom settings. Math anxiety is further correlated with feelings of apprehension, which affects one's math ability, negative attitudes towards math, or feelings of no confidence with math (Anditya & Murtiyasa, 2016).

To provide greater understanding, the relationship between anxiety and academic achievement or mathematical ability will be discussed. Efficient cognitive processing relies on two attentional mechanisms – a system driven by a goal/task and another driven by environmental stimuli (Luttenberger et al., 2018). Anxiety, however, disrupts the equilibrium between these two systems, causing the environmental stimuli system to become more dominant, thereby reducing the capacity to concentrate on task-relevant information in favor of threat-related stimuli. Put differently, this imbalance is linked to disturbances in cognitive processing, which makes it difficult to resist the influence of irrelevant stimuli and focus on task-relevant stimuli. In addition, mathematical anxiety appears to affect the speed of thinking more strongly than the accuracy of thinking. To illustrate, secondary students who have lower math anxiety appear to be more efficient and, as a result, complete more math questions per minute on their mathematical tasks (i.e., operations such as addition, subtraction, multiplication, division, and linear equations) when compared to those who have higher math anxiety (Luttenberger et al., 2018). The findings of these research studies suggest that the cognitive processing involved in forgetting mathematical content is significantly related to and influenced by math anxiety levels.

The phenomenon of mathematical bitterness can also be attributed to the prolonged exposure to the unpleasant treatment carried out by math teachers. Several studies investigating students' perceptions found that students tend to have negative emotions toward math lessons – one of which is caused by teachers' verbal and physically abusive behaviors (Hannula et al., 2005; Macmull & Ashkenazi, 2019). Additionally, previous studies have provided instances of specific forms of verbal abuse, such as comparing students within one class (Larkin & Jorgensen, 2015) or stigmatizing students who are perceived as failing to meet math teachers' expectations (Amirali, 2010). These unpleasant treatments typically lead to decreased enthusiasm and passion for learning mathematics.

Furthermore, within the context of the math teacher profile, such adverse treatment instills a negative perception from the student's perspective. Students, for example, label those math teachers as unfriendly (Gafoor & Kurukkan, 2015b; Kargar et al., 2010) and are not appreciative of their work (Almerino Jr. et al., 2019). As an emotional consequence, students eventually develop math anxiety, which is characterized by feelings of lightheadedness or nausea when they try to study and deal with mathematics (Awofala & Odogwu, 2017). These feelings ultimately affect students' performance and achievement in math negatively, as proven by findings in previous studies (Dirgantoro et al., 2023; Estonanto & Dio, 2019; Fan et al., 2019).

Students' prior experience or inability to understand math concepts can result in discomfort and frustration, which can foster negative perceptions of math (Mammana & Pennisi, 2011; Sierpinska et al., 2008). This might also occur when students struggle to connect

mathematical concepts to day-to-day scenarios, resulting in difficulties with problem-solving and making connections between mathematical concepts (Jailani et al., 2020; Mumcu, 2018).

Several factors also contributed to students' difficulty in grasping mathematical concepts, which could potentially result in students' low self-esteem regarding their mathematical ability. Gafoor and Kurukkan (2015a) and Lima et al. (2019) highlight the roles of cognitive and affective factors, such as difficulty retaining content, forgetfulness, and negative feelings toward mathematics. A tendency towards self-deprecating views regarding their math ability may also stem from experiencing difficulty or failure in understanding certain math concepts. Such a view can potentially shape the belief that they lack mathematical ability. Students' insecurity in their mathematical ability can pose a significant obstacle throughout the learning process, as it limits possibilities for exploration as well as the development of students' potential (Aguilar, 2021).

Based on these factors, efforts, therefore, need to be made to aid students in overcoming their math bitterness. This could involve, for example, the implementation of a learning approach that can motivate and provide extra support to help students overcome mathematical challenges. It is hoped that by motivating students to change their self-perception and by providing appropriate support, students can develop confidence and thus improve their math abilities over time. Teachers can also extend their roles beyond facilitators to shepherds who can further guide and mentor students (van Brummelen, 2015). Heyder et al. (2019) add that teachers' beliefs about students' abilities affect students' self-concept about their math abilities. In addition, it is important for students and parents to create an environment that is supportive, motivating, and fosters students' interests in mathematics. McGee & Spencer (2021) highlight the active role of African American parents in advocating for their children's education, including cultivating their children's interests in mathematics. Carmichael et al. (2017) emphasize the impact of teachers' enthusiasm on students' perception of 'a classroom mastery environment', which in turn predicts students' interests. Elliot and Bachman (2018) and Durksen et al. (2017) emphasize the importance of a home numeracy environment and effective student-teacher interaction to improve students' motivation and involvement in math. In other words, given appropriate support and a positive approach, students may perceive mathematics as an exciting challenge. This means that this research could be expanded into a broader study seeking solutions to address issues on mathematical bitterness.

Conclusion

This research has successfully constructed an instrument to measure mathematical bitterness related to teachers' factors through statistical analysis. There are 30 items representing six indicators of mathematical bitterness. These indicators are (1) having experienced unpleasant treatment from a mathematics teacher for a long time, consisting of 5 items; (2) having a negative view of mathematics, consisting of 5 items; (3) feeling untalented in mathematics, consisting of 3 items, (4) viewing the mathematics teacher as unfriendly, consisting of 6 items, (5) poor mathematics learning performance, consisting of 6 items, and (6) having high mathematical anxiety consisting of 6 items. This instrument is expected to be utilized in other

future research studies concerning issues related to mathematical bitterness. This instrument can also be employed across all levels of education, from elementary to higher education.

Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies, have been completed by the authors.

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Author Contributions

Kurnia Putri Sepdikasari Dirgantoro: Conceptualization, coordinate with reviewer, writing - original draft, editing, and interviewer; **Robert Harry Soesanto:** Writing - review & editing, formal analysis, methodology, and interviewer; and **Yanti:** Interviewer, coordinate with reviewer, validation, and supervision

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Appendix

The mathematical bitterness scale **related to teacher factor**

No.	Indicators	Items
1	Having experienced unpleasant treatment from a mathematics teacher for a prolonged period	1. Math teachers frequently give me physical punishment (e.g., hitting, pinching, etc.). 2. Math teachers frequently scolded me with harsh words. 3. Math teachers frequently compared me with other students. 4. Math teachers often time created a tense classroom atmosphere. 5. Math teachers often assign negative labels to me.
2	Having a negative view of mathematics	1. My life will be happy, even without math. 2. Math is a useless subject for me. 3. Math is a subject filled with many formulas that give me a lot of headaches. 4. Math has a direct connection to my everyday life. 5. Math is something that is scary for me.
3	Feelings of incapability in the subject of mathematics	1. I am sure that my talent is not in math. 2. No matter how much effort I put in, I will never be able to solve math problems. 3. I quickly give up even before starting to learn math.
4	Viewing the mathematics teacher as unfriendly	1. I often avoid my math teachers. 2. I perceive my math teachers as unsympathetic people. 3. In my opinion, math teachers tend to be unfriendly. 4. My math teachers are the teachers that I fear the most. 5. My math teachers often do not appreciate my effort in learning. 6. I often feel unwell (e.g., dizzy, nauseous) during math class.
5	Poor performance in mathematics	1. I often get below the passing grade scores in math tests. 2. I often get below passing grade scores for my math assignments. 3. I often have to take remedial for my math class. 4. My math score is the lowest in my school report. 5. I have never gotten satisfactory math scores.
6	Having high mathematical anxiety	1. I often feel stupid because I cannot understand Math. 2. I always feel disappointed with myself because I cannot do math questions. 3. I often feel scared and nervous when I am studying math. 4. Whenever I do a math test, my brain suddenly feels blank. 5. I am so scared whenever I am asked to do math problems. 6. I feel stressed out when I am having a math test.