THE ACCURACY PROPERTIES OF THE REFLECTIVE THINKING INDEX IN POLISH LANGUAGE NARRATIVES

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The assessment of the Reflective Thinking Index in narratives is considered as an insights indicator of the person constructing a story. The aim of this study was to verify the index validity. 553 adults took part in the study. The respondents wrote a story about their close relationship and filled in questionnaires measuring the state and trait anxiety, depression, and personality disorder traits. In the narratives, all the phrases constituting the Reflective Thinking Index components were counted using a computerized method. Then, a cluster analysis was performed using the k-means method to distinguish types of people with specific index values. Next, it was checked whether the identified subtypes of the index allow differentiating people with an optimistic vision of the situation, high vs low levels of anxiety state/trait, high vs low levels of depressive mood, and various personality disorder traits. To demonstrate index sensitivity, specificity, and precision, ROC curves were analyzed. The results indicate that the Reflective Thinking Index varies depending on the level of state/trait anxiety, optimistic vision of the situation, depressiveness, and education level. High Reflective Thinking is associated with average sensitivity, low specificity, and average precision in the prediction of an optimistic situation vision. The low Reflective Thinking Index is characterized by average sensitivity, low specificity, and average precision in the prediction of state/trait anxiety. The obtained accuracy properties of the Reflective Thinking Index suggest some caution in its application and interpretation.

Keywords: reflective thinking index; narratives; insight; accuracy of the index

Among automated quantitative techniques to support narrative analysis, there is the LIWC program created by Pennebaker et al. (2001, 2007). It was

originally developed for the English language and is used to automatically count words in various texts. Since the 1990s, when the software was developed, many adaptations have been made for other languages (Boyd et al., 2022). During a LIWC analysis, each word in the analyzed text is compared with the content of the built-in dictionary developed by the authors. If a given word from the text appears in the dictionary, then the word is recorded and included in a specific category (Pennebaker et al., 2001, 2007). Pennebaker et al. (2003, 2015) proposed many categories, among which, in different LIWC versions, there are categories related to cognitive processes. These categories, for example, include words related to insight, such as *consider*, *know*; causation, such as *because*, *cause*, *effect*; and tentativeness, such as *perhaps*, *guess*. Pennebaker et al. (2003) also proposed Analytical Thinking and Reflective Thinking among categories allowing for estimating cognitive processes. The former is identified with an impersonal way of transmitting information, and a more formal style of expression (Pennebaker et al., 2014). On the other hand, Reflective Thinking means a more personal message and an individual approach to the situation. Reflective thinking is manifested in the narrative through the use of words or phrases that indicate cognitive processes and cognitive elaboration of the situation or material (Boyd et al., 2020; Vine et al., 2020). It has been found that in narratives about a trauma or stressful event, there are more manifestations of Reflective Thinking, while in formal/official texts the indicator of Analytical Thinking was higher (Pennebaker & Stone, 2003).

People who want to give meaning to stressful situations often use words in their statements that indicate cognitive information processing. These include words such as *recognize, depend, think*. Such words are definitely less used by people who do not experience stress and do not try to cognitively elaborate on the experiences related to it. It was found that the use of causal words (e.g., *because, effect, hence*) and insight words (e.g., *think, know, consider*), which are two specific subcategories belonging to the Mental Processes category according to LIWC, are associated with describing past events and improving health functioning (Pennebaker & Lay, 2002). Based on the comprehensive analysis of six studies on the expressive writing effectiveness, Pennebaker et al. (1997) concluded that an increase in the use of causal and insight words is significantly associated with improved mental well-being. These results suggest that the shift from non-processing to the active cognitive elaboration of the event during emotional writing leads to improved well-being. Experiments conducted by the researchers confirmed that the frequent use of words indicating causality and insight can be analo-

gous to the formulation of reflection (Pennebaker et al., 1997). Another study that also measured the use of such words in statements about traumatic events have shown that people with higher scores in these LIWC categories have better health outcomes (Kross & Ayduk, 2008).

Furthermore, an increased number of insight/causal words were also recorded in stories about romantic relationship breakups (Seraj et al., 2021). People used more cognitive mechanisms when describing a painful relationship breakup, in particular words indicating the causes. The number of such words in the breakup and post-breakup time description was compared to the description before the breakup (Boals & Klein, 2005). "Causal words" are used to mentally organize an event, reflect on it, and explain its causes (Seraj et al., 2021). In general, studies showed that "causal words" have been used in situations describing the most traumatic events, for instance, terrorist attacks (Cohn et al., 2004) or health crises (Pennebaker & Lay, 2002). It was found that, in general, the Reflective Thinking increases in situations of high psychological stress.

The way of thinking may vary according to subjective and situational characteristics, and the linguistic indicators proposed by the LIWC may reveal these differences. In the latest LIWC version, there is a category of Cognitive Processes, which includes words such as *cause, know*, and *ought*. The following subcategories were distinguished in this category Cognitive Processes: Insight (*think, know, consider*), Causation (*how, because, make, why*), Discrepancy (*would, would, can, could*), Tentative (*if, or, any, something*), Certitude (*really, actually, of course, real*), Differentiation (*but, not, if, or*), Inhibition (*block, constrain*), Including words (*with, and, include*), Excluding words (e.g. *but, except, without, exclude*) (Boyd et al., 2022; Tausczik & Pennebaker, 2010).

Research on the LIWC psychometric properties has been conducted on English-language material for quite some time. The LIWC psychometric properties have been tested many times and the latest version has been shown to be very reliable; virtually all LIWC categories are characterized by high reliability (Boyd et al., 2022). It was also crucial to determine the accuracy and, in this aspect, the LIWC's validity for the English-language material was confirmed. It should be emphasized that studies on accuracy relied on comparisons of the LIWC with other language measures, not with questionnaire techniques (Boyd et al., 2022). Accuracy was also tested in relation to other languages, which is crucial, for example, according to the authors of the Chinese version, as it allows the tool to be used for other than English material (Zang et al., 2016). Research into the validity of the Chinese

CVLIWC version has also yielded positive results; the specificity and precision of many categories have been demonstrated (Zang et al., 2016).

Similarly, it is important to assess the LIWC accuracy on Polish-language material due to significant differences between English and Polish. An indicator of cognitive processes was developed, specifically the Reflective Thinking Index, based on Polish-language material. This indicator seems to be particularly important in terms of predicting the level of insight/cognitive information processing. Based on the research using LIWC and the analysis of words in Polish that are equivalent to aspects of the Reflective Thinking Index (this index was called the Mental Processes Index in our earlier work), an index for the Polish language was developed, which included perceptual-mental predicates (e.g., *myślę, widzę, sądzę, uważam, wydaje mi się*), assumptions and doubts (e.g., *może, chyba, bym*), causality (e.g., *aby, gdyż, ponieważ*), questions (e.g., *Co ja właściwie robię*?) (Gawda & Czubak-Paluch, 2021; Kosacka, 2019). It was assumed, in accordance with the research results for English-language material, that the presence of the above-mentioned words/terms in the narratives will indicate cognitive information processing, the insight level of the person constructing the story, reflections on the state/situation, or the degree of event mental elaboration or prediction of a given situation. In accordance with the assumptions made on the basis of the literature that such an index differentiates the narratives of people with various insight associated to various psychopathology types, a study was conducted on a group of prisoners and it was shown that prisoners build narratives about close relationships in such a way that they are characterized by a lower Mental Processes Index than non-incarcerated persons (Gawda & Czubak-Paluch, 2021). These results were interpreted as a symptom of lower insight and less advanced self-reflection among prisoners.

In another study on the Mental Process Index in Polish-language material, it was shown that the understanding of emotions and the level of emotional intelligence are significant predictors for the Mental Processes Index. The higher the level of understanding emotions as measured by the TRE test and the higher the level of emotional intelligence measured by the Popular Emotional Intelligence Questionnaire, the higher the level of the Mental Processes Index in the narratives about contentment and anxiety (Kosacka, 2019). Higher emotional competencies are associated with the use of phrases such as *I think, I see, I believe, I believe, I think, I suppose,* assumptions and doubts (*maybe, I think, I would*), descriptions of justifications/reasons or expressing questions (Kosacka, 2019).

Aim of the Study

On the basis of the cognitive processes/indicators categories of thinking/insight according to Pennebaker, a Polish equivalent of the Reflective Thinking category was created (currently, the name Mental Processes Index has been abandoned as this name seems too general). An original study was conducted focusing on establishing the validity index properties. To the best of my knowledge, this is the first attempt to test the validity of the Reflective Thinking Index on Polish-language material. Data shows that this indicator is higher in the narratives describing stressful/traumatic situations and reflects the level of cognitive information processing/cognitive insight. Based on this, it was assumed that the index will be differentiated in the narratives of people with different levels of insight associated with different levels of anxiety as a state/trait, depressiveness, personality disorder traits, presenting positive vision of a situation, and people with different education levels. If these assumptions were confirmed, the next purpose was to determine sensitivity, specificity, and precision parameters of the Reflective Thinking Index (Wskaźnik Refleksyjnego Myślenia, WRM). Validity data are crucial because high values of these parameters would mean that the tested indicator could be effectively used in narrative research.

METHOD

Participants

The study involved 553 adults from the general population (300 men and 253 women) aged 19 to 46 years. The mean age of the participants was 28 years and 5 months ($SD = 10.25$). The education level varied, including 5% subjects with primary education, 10% with vocational education, 45% with secondary education, and 40% with higher education. Participants were recruited using an advertisement. The inclusion criteria were ages between 18 and 65, absence of acute psychotic, substance dependence, and other neuropsychiatric disorders as they can have an impact on linguistic production. All subjects meeting the inclusion criteria were examined. The sample was randomly selected (a Wald–Wolfowitz test confirmed the randomness of the sample at $p > .05$). The research was conducted individually in colleges, universities, and psychological offices. Participants completed questionnaires, a survey, and they wrote narratives (each respondent wrote one story)

in the presence of a psychologist; they were guaranteed anonymity, and Polish is their mother tongue. They gave informed written consent, and the assessment procedure was approved by a local institutional committee. Participation in this study was voluntary. The participants were not paid.

Research Procedure and Measures

After completing an initial demographic survey and questionnaires, participants were asked to write a story about their close relationship/love. They were asked to recall their relationship with the closest person, i.e. wife/husband, partner, and to write a story about it. The instruction was as follows: "Try to think what love means to you. Think of an event in your life that was or is connected with love. Write a story about it."

Narrative Analysis

The narratives were transcribed by the experimenters and entered into a text-analyzing computer program developed in Python. Based on the Pennebaker method (Boyd et al., 2022; Pennebaker et al., 2015), a list of Polish component of the WRM index was established. The software counted the number of words/syllables/word-formation bases in each narration as below and compared these numbers to the number of all words in the narration. The WRM components are as follows: (1) mental predicates*: myślę, myśl, widzę, widz, sądzę, sąd, sądz, uważam, uważ, zrozumieć, rozum, wydaje mi się, wydaje, dojrzeć, tłumacz, dorasta, wiedzieć, wie, wiem, pozna, ciekaw, pamięta, świadom, wątp, postanowi, stanowi, jest pewny że, pewn*; (2) supposition/doubt/causality: *może, chyba, bym, aby, gdyż, ponieważ, bo, by, skoro, że*; (3) questions: *pytanie, pyta*, number of interrogation points in a narration'?'/ number of questions.

In the narratives, terms referring to the optimistic vision of the situation described by the respondents were also counted. The optimistic vision included a positive self-description, i.e. the author of the story (actor) and a positive description of the partner. This variable is quantitative, all positive statements referring to the others were counted (Gawda, 2011). The sum of these terms was an indicator of a positive vision of the situation. Here are examples of the text fragments: *piękna kobieta* 'beautiful woman', *ona jest cudowna* 'she is wonderful', *wspaniała* 'gorgeous', *jestem szczęśliwa* 'I am happy', *kocham go* 'I love him'. All these elements were counted automatically using software created for narrative research. A similar program that

enables automatic word counting has already been used in previous narrative research conducted in Polish (Gawda & Czubak-Paluch, 2021). After the automatic count, competent judges double checked and corrected the results.

State-Trait Anxiety Inventory

The STAI is used for measuring the trait and state of anxiety following Spielberger's approach (Spielberger et al., 1970). The Polish STAI adaptation consists of 20 statements describing emotional states. Respondents assessed how each statement fits them on a 4-point scale: $1 = rarely$, $2 = sometimes$, $3 = often$, and $4 = usually$. The STAI reliability and validity are very high (Sosnowski et al., 2006). Cronbach's alpha in this study for trait anxiety is .87, and for state anxiety .88.

Beck Depression Inventory (BDI-II)

The Beck Depression Inventory/Depressive Mood Scale is a self-report technique used to assess the presence and severity of depression symptoms. It consists of 21 items and four answer variants are possible, which are assessed in terms of increasing symptom intensity, which is reflected in the score 0–3. The inventory is one of the most frequently used techniques for measuring depressed mood in psychological research. The psychometric properties of the tool are very high (Zawadzki et al., 2009). Cronbach's alpha in this study is .89.

Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders 4th edition Axis II Disorders (SCID-4)

All ten DSM-4 personality disorders were included in the interview based on the SCID-4 (Polish adaptation of First et al., 2010). It is a standardized tool that enables the diagnosis of 10 personality disorders according to the DSM-4 criteria and two additional disorders. The psychometric properties of this tool are appropriate (First et al., 2010). All variables were quantitative; reliability in this study was assessed using Cronbach's alpha measures, which are: antisocial (.745), avoidant (.712), dependent (.703), schizoid (.732), schizotypal (.705), paranoid (.743), narcissistic (.789), histrionic (.694), borderline (.883), obsessive-compulsive (.723).

RESULTS

In the beginning, correlation analyses were performed between the WRM scores and other variables. Since the variable distribution deviated from normal (see Table 1), the τ-Kendall correlation coefficient was used. It was found that the WRM correlates significantly and positively with only one variable: the optimistic vision of the situation expressed in the narratives, $τ = .32$, $p < .001$. This means that a more optimistic/positive description of the characters in the narrative about the close relationships is accompanied by more elements of insight/cognitive elaboration of the situation. Other correlations were statistically non-significant.

Table 1
Descriptive Statistics

Variables	*M*	*SD*	Min.	Max.	*p*
WRM	5.10	3.58	0	29	.001
State anxiety	41.71	10.36	19	74	.001
Trait anxiety	42.78	9.59	19	76	.001
Depressiveness	13.90	9.72	0	57	.001
Optimistic vision of situation	3.89	2.34	1.23	13.45	.001
Dependent PD traits	2.19	1.56	0	7	.001
Paranoid PD traits	2.77	1.04	0	8	.001
Obsessive-compulsive PD traits	3.38	1.08	0	8	.001
Schizoid PD traits	1.92	1.29	0	6	.001
Schizotypal PD traits	3.12	1.31	0	11	.001
Avoidant PD traits	1.93	1.83	0	7	.001
Narcissistic PD traits	4.94	2.17	0	16	.001
Histrionic PD traits	2.56	1.87	0	7	.001
Borderline PD traits	5.13	3.51	0	15	.001
Antisocial PD traits	2.70	2.60	0	15	.001

Next, it was checked whether and how education differentiates the WRM scores. A one-way variance analysis was performed and it shows that the level of education significantly differentiates the WRM, $F(3,499) = 12.98$, $p < .001$, $η^2 = .06$. *Post hoc* analyses with the use of the Scheffé test revealed that people with higher and secondary education have a significantly higher WRM scores than people with primary and vocational education (see Figure 1). The effect size for these differences is average.

Figure 1

Education and WRM Scores
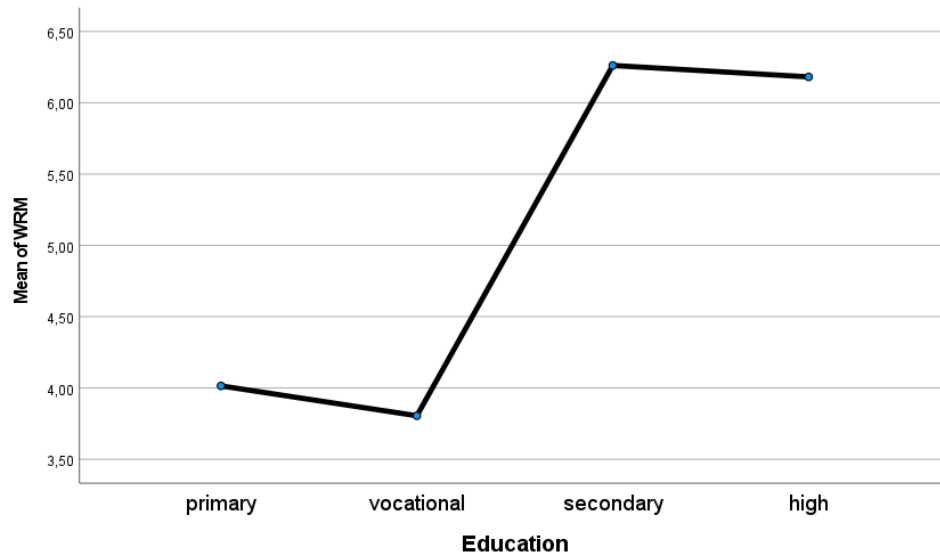
Then, analogously, it was checked whether the level of personality disor-der traits measured by SCID-II differentiates the WRM scores. A variance analysis was performed, where the dependent variable was WRM and the independent variables were personality disorder traits (high severity vs. low severity of personality disorder traits in clusters A, B, and C). The analysis showed no significant differences. This most likely means that people with high and low personality disorder trait severity from clusters A, B, and C, according to DSM-4, do not differ in terms of the WRM scores (see Table 2).

Table 2

Analyses of Variance: Personality Disorder Traits and WRM

	F	p	η^2
Cluster C	.47	.495	.00
Cluster A	.48	.488	.00
Cluster B	.02	.894	.00

Note. Dependent variable: Reflective Thinking Index (WRM); independent variables: clusters of PD traits.

Since the correlations and variance analysis results obtained for the group—taking into account the full variable spectrum—did not deliver the expected results, it was decided to conduct a person-centered analysis, and a *k*-means cluster analysis was performed to identify people types with specified WRM values. This means a more precise ("personalized") approach to the analysis. A *k*-means clusters analysis allowed the identification of WRM types. As a result of this analysis, four separate clusters were obtained grouping people with specific WFM values, $F(3,550) = 1167.52$, $p < .001$, $\eta^2 = .08$. The values for the final cluster centers are presented in Table 3.

Table 3
Final Cluster Centers for WRM

	Number of clusters			
	1	2	3	4
Reflective Thinking Index	14.39	23.71	2.42	8.03

Then, it was checked whether the WRM clusters differentiated the level of anxiety, depressiveness, and a positive vision of the situation. It was found that the results of the variance analysis were significant. The WRM types significantly differentiate the level of state/trait anxiety, depressiveness, and optimistic vision of the situation (see Table 4). In order to show the differences between specified types of WRM clusters, *post hoc* comparisons with the use of the Scheffé test were performed. It was found that people from cluster 1, i.e. with high WRM, are characterized by lower levels of state anxiety and trait anxiety compared to the people from cluster 3, i.e. with low WRM (see Figure 2). Other differences between clusters were non-significant. People with a low WRM level are characterized by an elevated level of state and trait anxiety.

Furthermore, people with high WRM also verbalize the most optimistic vision of their relationship (see Figure 3). Even though the WRM types, in general, differentiate the level of depressiveness (see Table 4), *post hoc* analyses of depressiveness did not show any significant differences between the individuals within different WRM clusters. These results suggest that there is no directly proportional relationship between the WRM type and other variables. It means that it made sense to perform a cluster analysis that revealed the detailed WRM types which allows for a more thorough WRM analysis.

Table 4

Analysis of Variance: Clusters for WRM and Dependent Variables

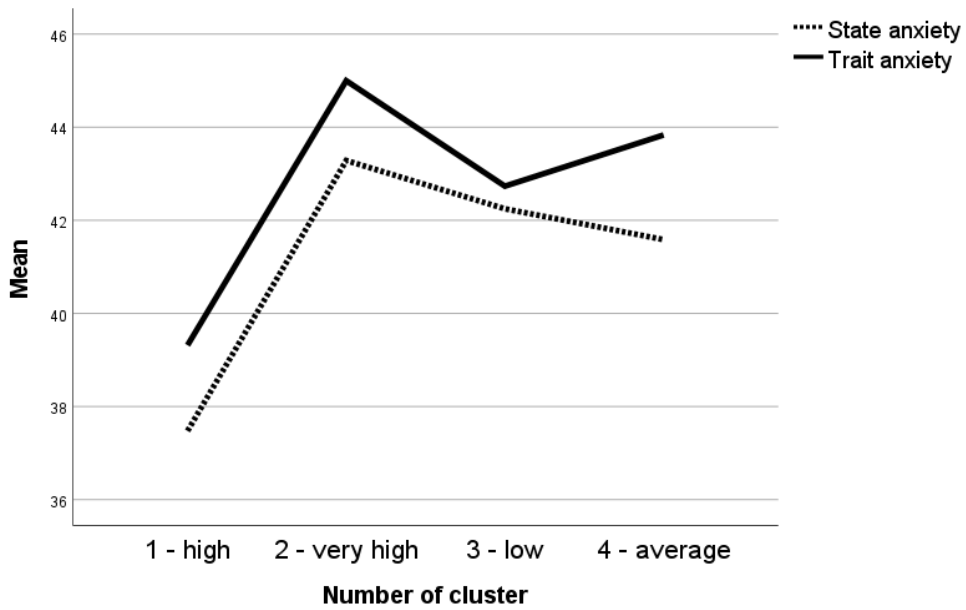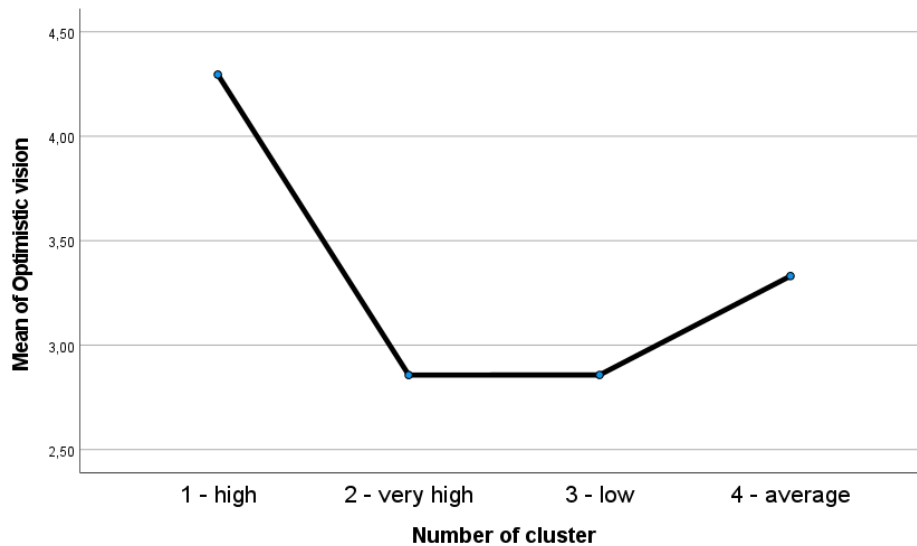| Dependent variables	WRM cluster	
	F	η^2
State anxiety	2.85*	.015
Trait anxiety	2.64*	.014
Depressiveness	2.65*	.014
Optimistic vision of situation	5.60***	.030

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

Figure 2

WRM Clusters and State and Trait Anxiety

Figure 3

WRM Clusters and Optimistic Vision of Situation

Due to the fact that the specified WRM types (i.e. Clusters 1 and 3) in the narratives differentiated state/trait anxiety and the optimistic vision of the situation, ROC curve analyses were performed in order to precisely determine the WRM accuracy parameters, i.e. sensitivity, precision, and specificity (see Figure 4). Analyses for WRM Cluster 3 (low WRM) showed that the model is significant for trait anxiety and state of anxiety but not for the optimistic vision of the situation. The area under the ROC curve indicates the diagnostic accuracy of Cluster 3. In general the larger area under the ROC curve is associated with the more accurate tests. However, Figure 4 shows that the areas under the ROC curves for trait anxiety (.628) and state anxiety (.610) are not large. The cut-off point for state anxiety is 42.5 and trait anxiety is 46.5. The coordinates of the ROC curves (see Figure 4) allow us to conclude that this indicator, i.e. low WRM, is characterized by average sensitivity (.584), low specificity (.386), and average precision (.504) for predicting anxiety as a state. These values indicate that there is a poor possibility of discrimination of state anxiety based on the low WRM.

With regard to trait anxiety, the indicator is characterized by average sensitivity (.502), low specificity (.212), and average precision (.502). The obtained results show a poor possibility to discriminate trait anxiety based on the low Reflective Thinking Index. The model that takes into account Cluster

3 is irrelevant to the optimistic vision of the situation articulated in the narratives (see Figure 5).

Similar analyses of the ROC curves were conducted for Cluster 1, i.e. high WRM level (see Figure 6). The analysis showed that the model is significant only for the optimistic vision of the situation. The area under the ROC curve for the optimistic vision of the situation (.644) indicates that Cluster 1 (i.e. high WPM) is not very accurate in identifying an optimistic vision in the narratives. The cut-off point (3.5) was established. The coordinate values of the ROC curves allow us to conclude that the high WRM index in relation to estimating an optimistic vision of the situation is characterized by low sensitivity (.484), low specificity (.324), and average precision (.695). These values indicate a poor possibility to discriminate against optimistic vision based on high WRM. The model is not significant for trait and state anxiety (see Figure 7).
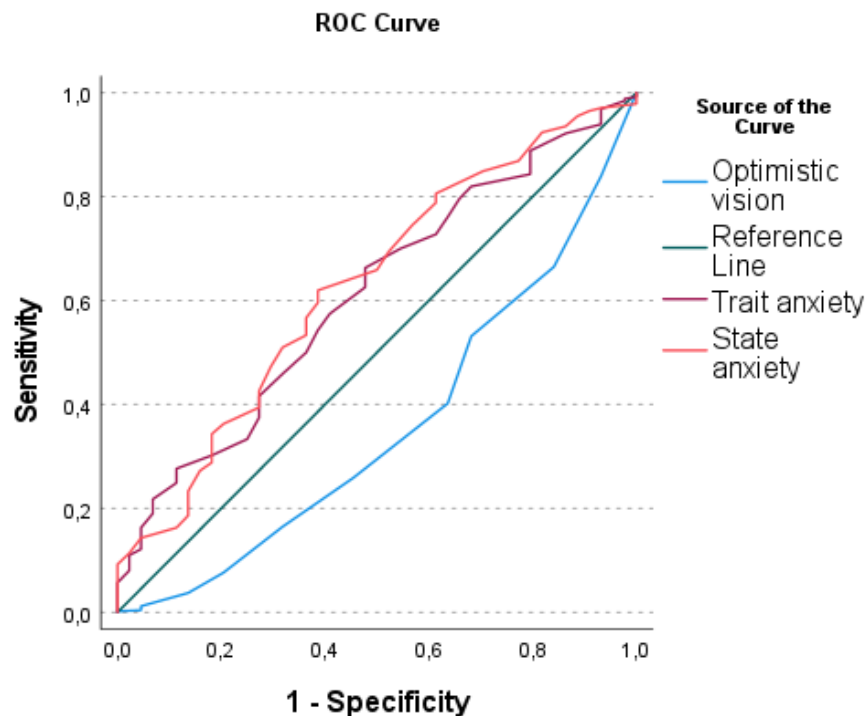
Figure 4
ROC Curves for Cluster 3 (Low WRM)

Figure 5

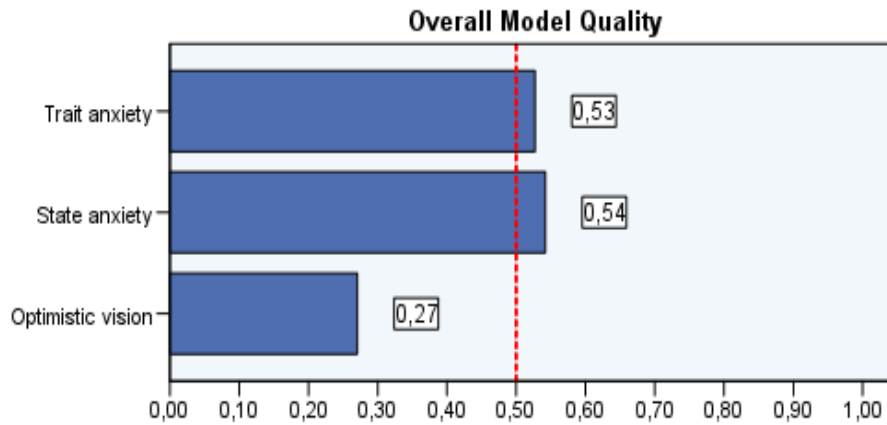*Overall Quality of Model for ROC Curves for Cluster 3 (Low WRM)*

Figure 6
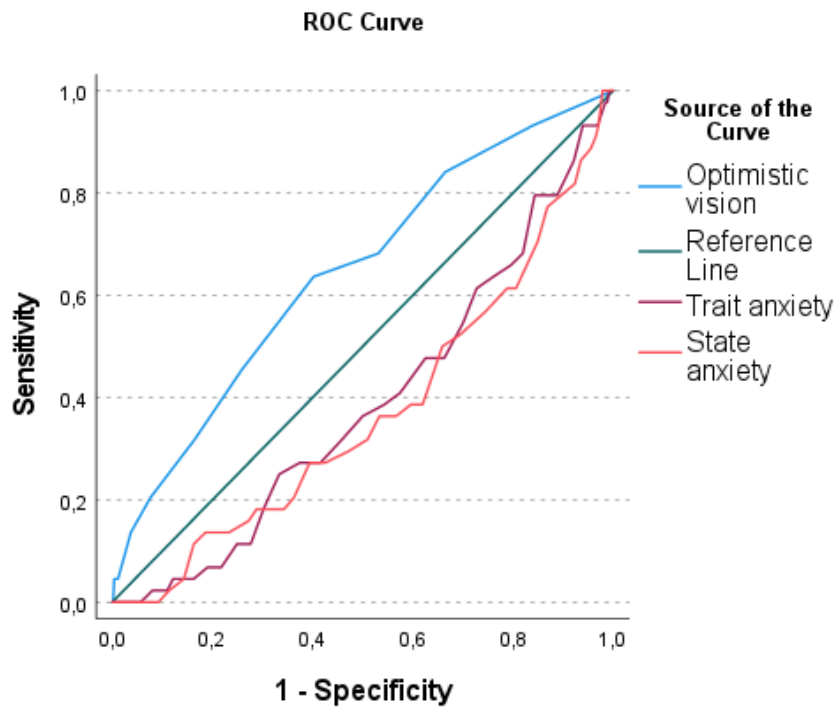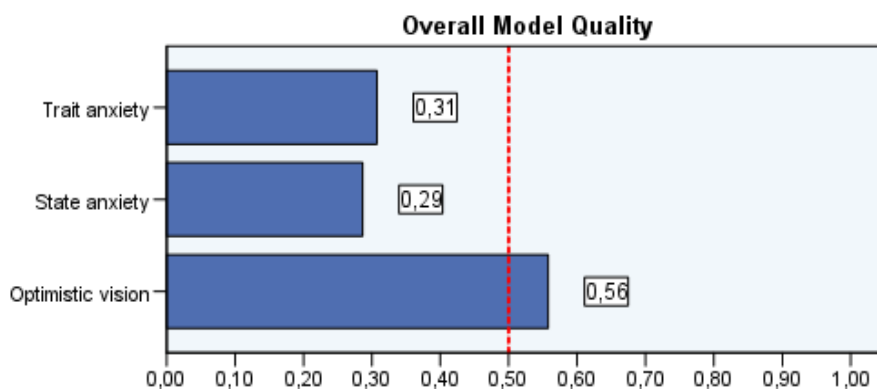
ROC Curves for Cluster 1 (High WRM)

Figure 7

Overall Quality of Model for ROC Curves for Cluster 1 (High WRM)

DISCUSSION

The study sought to determine the accuracy of the Reflective Thinking Index on the Polish-language material. The results showed that it is related to the level of education, trait, and state of anxiety, and the narrative expression of an optimistic vision of the situation. According to the assumptions, the reflective Thinking Index is a measure of insight into the situation or cognitive level of the situation (Pennebaker et al., 2005; Tausczik & Pennebaker, 2010). The results indicating that people with secondary and higher education have a higher WRM score, which confirms our study assumptions. People with higher education have richer vocabulary and greater communicative competencies, so they are more likely to use phrases in their statements that indicate critical thinking, consideration, and analysis of the situation (Miyake et al., 2000). With regard to the level of insight in people with mental characteristics such as high personality disorder traits or depressiveness, the WRM was found as inaccurate.

To be more precise, the WRM accuracy examination in relation to trait/state anxiety prediction and optimistic vision of the situation brought valuable results. It is worth emphasizing that in this context *a person-centered-analysis* approach was very appropriate (Gawda, 2022). It was

found that low WRM is characterized by an average sensitivity, low specificity, and average precision with regard to indicating state and trait anxiety. It can be concluded that when a person uses mental predicates, assumptions, or questions in narratives to a small extent (value up to 3 elements in the narrative according to Table 3), we find a high level of emotional tension/fear/anxiety. Low specificity of WRM may indicate emotional states or mental processes other than state/trait anxiety. Moreover, it is not specific to use such a high number of terms in the narrative included in the WRM only for the feeling of fear. The obtained result contradicts to some extent findings that report, for instance, frequent use of words indicating insight by people with suicidal tendencies (Pająk & Trzebiński, 2013), high frequency of cognitive words in stories about breakups (Seraj et al., 2021), stories about crisis situations (Cohn et al., 2004; Pennebaker & Lay, 2002), or in situations of increased psychological stress (Pennebaker & Lay, 2002).

Low WRM means that people who are anxious or have the disposition to feel anxiety tend to have a rather reduced insight into the situation. Such people neither analyze the situation thoroughly, nor reflect on it, nor anticipate solutions. The obtained result is to some extent consistent with the data on the negative impact of anxiety on cognitive processes. Fear as a trait blocks the semantization process, favors use of concrete codes, prevents the use of abstract codes (Obuchowski, 2004), contributes to reducing expression richness about feelings (Gawda, 2007), and reduces performance level in verbal fluency tasks (Szepietowska & Gawda, 2011). Studies on language show the disorganizing effect of anxiety on a verbal expression which is manifested by many indicators of verbal fluency disturbances, such as mistakes, errors, stuttering, repetitions, onomatopoeic expressions, and unfinished sentences (Gawda, 2018). Many studies confirm the negative impact of the state and trait anxiety on the processes of attention, memory, and decision-making, indicating that anxiety is conducive to focusing on negative stimuli, on the threat, and at the same time it impairs cognitive processes (Gawda & Szepietowska, 2016; Hartley & Phelps, 2010, 2012). The effect of this may be a reduction in reflective thinking. A lower WRM was also found in prisoners, which indicates a lower mental processing capacity and greater difficulties in solving problems in a flexible way, decreased ability to overcoming dysfunctional behaviors, or modifying them into more functional behaviors (Diamond 2013; Gawda & Czubak-Paluch, 2021). It has been shown that prisoners perform less cognitive processing of various events which results in less insight and difficulties in coping and behavior control

(Gawda & Czubak-Paluch, 2021). A low level of reflective thinking can lead to low coping skills and lowered mood (Diamond, 2013).

On the other hand, the result indicating that a high WRM (approximately 14–15 elements/phrases/words based on the results in Table 3) accompanies an optimistic vision of the situation is consistent with the results confirming the relationship between the frequency of using words indicating thinking/insight/causality and improvement of the health situation, e.g. as a result of expressive writing (Pennebaker et al., 1997), or better results in the area of health (Kross & Ayduk, 2008; Pennebaker et al., 2014).

The obtained results on accuracy contradict the data on the high LIWC validity of the Cognitive words/Cognitive Processes category (Boyd et al., 2022) and the high sensitivity of the Chinese SCLIWC version, where for the Causality category the value for sensitivity is .87 (Zhao et al., 2016). Perhaps the differences between the English and Chinese versions and the Polish version result from language specificity or from the fact that in the mentioned English/Chinese versions validity was tested in relation to single categories such as Causality/Insight, and not the grouped WRM index covering categories, i.e. insight, causality, questions, assumptions, and doubts which were considered in this study. The grouped indicator seems to be a more reliable measure than single categories. However, it has been found that despite the fact that it differentiates various groups of people with different characteristics, it is not characterized by high accuracy (average sensitivity, low specificity, and average precision) parameters.

Limitations

Despite the fact that the study was carried out on a large sample and relied on a variety of techniques, the study might have limitations. Perhaps the narrative topic or the narrative type was the key factor determining the values obtained in terms of the WRM index. The participants wrote narratives about a close relationship that could contain many positive expressions. The story about positive and negative events significantly differentiates the level of WRM and its functions. It has been shown that, especially in the narratives about anxiety, the frequency of using insight or causality words increases, but not in the narratives about satisfaction (Kosacka, 2019). In the current study, narratives about a close relationship that were not fully negative were analyzed. And this could have resulted in a smaller number of utterances/words associated with reflective thinking than in the case of

narratives with clearly negative topics. Therefore, the next step in WRM research would be a WRM index analysis of narrative material concerning various topics.

Conclusions

To conclude, the use and interpretation of the WRM index should be carried out with caution. It can be a measure (to a certain degree) of insight or cognitive elaboration of a situation expressed in narratives. However, its specificity is low, which means that this indicator is not specific for the insight associated with a specified type of disorder or personal characteristics. Also, the values of the other WRM accuracy parameters, i.e. sensitivity and precision, are average.

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