



Future Anxiety in Young Spanish Adults: Psychometric Properties of the Dark Future Scale

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Título: Ansiedad Futura en Adultos Jóvenes Españoles: Propiedades Psicométricas de la Dark Future Scale.

Resumen: *Antecedentes/Objetivo:* La Dark Future Scale (DFS) evalúa la tendencia a pensar en el futuro con ansiedad, miedo e incertidumbre. Aunque ha sido usada en diferentes poblaciones, los estudios instrumentales son escasos y no hay una versión adaptada al español. El objetivo del estudio fue adaptarla al español (DFS-S) y analizar sus propiedades psicométricas en una muestra de adultos jóvenes. *Método:* Participaron 1.019 jóvenes entre 18 y 24 años. Completaron la DFS-S y el IPIP-BFM-20. Se analizan evidencias de validez basadas en la estructura interna, incluyendo la invarianza de medida según el género, y basadas en las relaciones con rasgos de personalidad, así como análisis de la fiabilidad y de las diferencias de género. *Resultados:* Los resultados apoyaron una estructura de un solo factor, $\chi^2(5) = 10.79$, CFI = .999, RMSEA = .034, SRMR = .016, con invarianza respecto al género, y con coeficiente de fiabilidad satisfactorio ($\omega = .92$). Se encontró correlación positiva fuerte entre ansiedad futura y neuroticismo (.42) y una correlación negativa moderada con extraversión (-.25). Las puntuaciones en ansiedad futura fueron mayores en las mujeres. *Conclusiones:* Los resultados muestran propiedades psicométricas satisfactorias de la DFS-S, siendo un instrumento adecuado para medir la ansiedad futura en adultos jóvenes.

Palabras clave: Ansiedad futura. Perspectiva de tiempo futuro. Adultos jóvenes. Rasgos de personalidad. Propiedades psicométricas.

Abstract: *Background/Objective:* The Dark Future Scale (DFS) is a self-report instrument which assesses the tendency to think about the future with anxiety, fear, and uncertainty. Although it has been applied in different populations, instrumental studies are scarce, and there is no validated Spanish version. The aim was therefore to develop a Spanish version of the scale (DFS-S) and to analyze its psychometric properties in a sample of young adults. *Method:* Participants were 1,019 individuals aged from 18 to 24 years. They completed the DFS-S and the IPIP-BFM-20. Validity evidence based on the internal structure, including measurement invariance across gender, as well as on relationships with personality traits was obtained. Reliability and gender differences in DFS-S scores were also examined. *Results:* Results supported a single-factor structure, $\chi^2(5) = 10.79$, CFI = .999, RMSEA = .034, SRMR = .016, that was invariant across gender. Reliability of test scores was satisfactory ($\omega = .92$). In the correlation analysis, future anxiety showed a strong positive correlation with neuroticism (.42) and a moderate negative correlation with extraversion (-.25). Females scored higher than males on future anxiety. *Conclusions:* The DFS-S has satisfactory psychometric properties and it is an adequate tool for measuring future anxiety among young adults.

Keywords: Future anxiety. Future time perspective. Young adults. Personality traits. Psychometric properties.

Introduction

The future time perspective involves cognitive processes, emotions, and attitudes towards future events, and it may be positive or negative. The positive perspective toward future events is characterized by feelings of hope and a focus on planning and achieving future goals, thus promoting well-being and healthy behaviors. By contrast, the negative perspective is characterized by feelings of worry, fear, and anxiety. These two visions are not mutually exclusive but can be experienced simultaneously. However, when the negative perspective prevails, it may have a negative impact on physical and mental health (Carelli et al., 2015; Zaleski, 1996, 2005; Zaleski et al., 2019).

Zaleski (1996) identified future anxiety as one of the basic elements of a negative future time perspective, defining it as a state of apprehension, uncertainty, fear, worry, and concern about unfavorable changes in the future. What distinguishes future anxiety from other types of anxiety is that it refers to a more distant personal future. Furthermore, it is a conscious form of anxiety that may influence thoughts, emotions, and behaviors, increasing the fear of future events and the anticipation of changes perceived as dangerous or ad-

verse. Individuals with higher levels of future anxiety usually fear global disasters (e.g., earthquakes or wars) or painful personal experiences (e.g., losing a loved one, accidents, or illnesses). It is argued that the basis of future anxiety is personality traits that determine how a person responds to fear, personal experiences, and current events (Zaleski, 1996, 2005; Zaleski et al., 2019).

Based on this conceptualization of future anxiety, Zaleski developed the Future Anxiety Scale (FAS; Zaleski, 1996), a self-report instrument that assesses the tendency to think about the future with uncertainty, anxiety, and fear. The FAS comprises 29 items, each rated on a 7-point Likert-type scale from 0 (decidedly false) to 6 (decidedly true), with higher scores indicating greater concern about the future. Zaleski (1996) reported satisfactory psychometric properties for the FAS, the scores on which were positively correlated with scores on anxiety, hopelessness, and neuroticism. These associations provide validity evidence based on the relationship of the FAS with other variables and highlight the relationship between future anxiety and personality traits related to anxiety.

More recently, Zaleski et al. (2019) developed a shorter version of the FAS, the Dark Future Scale (DFS), in a sample of Polish adults. The DFS comprises just 5 of the 29 items in the FAS, and it employs the same 7-point Likert-type rating scale (from 0, decidedly false to 6, decidedly true). Confirmatory factor analysis supported a single-factor structure, and reliability based on Cronbach's alpha was .90.

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Scores on the DFS were positively and strongly correlated with scores on the Future Negative scale (FN; Carelli et al., 2011), and positively and moderately associated with scores on the past-negative and present-fatalistic subscales of the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). Analysis by gender showed that females scored higher than males on future anxiety.

Although developed only recently, the DFS has already been applied in different populations, including samples from Poland (Duplaga & Grysztar, 2021; Sobol et al., 2020), Italy (Rapelli et al., 2021; Scandurra et al., 2021), Germany (Dadaczynski et al., 2021), Canada (Watson, 2020), Turkey (Armağan & Durukal, 2021), and other Asian countries, namely Iran, China, the Philippines, and Singapore (Leung et al., 2021; Shabahang et al., 2021). It has also been used in a cross-national study involving emerging adults from China, Italy, Lithuania, Portugal, Slovenia, and the USA (Lanz et al., 2021). The findings overall suggest increasing levels of future anxiety, with higher scores in females, and people who score higher on the DFS (indicating a more negative perception of the future) tend to have lower physical and psychological well-being.

Studies that have focused specifically on young adults have found that they report, among other things, psychological distress, uncertainty, anxiety, and future worries, with future anxiety being related to online news addiction and to an increased likelihood for multiple health complaints (Dadaczynski et al., 2021; Lanz et al., 2021; Shabahang et al., 2021). The perception of the future is critical for young adulthood, because it is during this period that individuals make important life decisions such as choosing to embark on university studies, looking for their first job, or deciding where they will live. Accordingly, a fear of academic failure or worries about a lack of job opportunities may produce anxiety about what lies ahead. From the research perspective, there is also a growing interest in the study of future anxiety among young adults due to the health, social, and economic changes and challenges that society is facing (e.g., Dadaczynski et al., 2021; Lanz et al., 2021).

Given this interest, there is a need for adequate tools to measure future anxiety. The DFS is a brief and reliable instrument that, based on the aforementioned research, would appear to be suitable for this purpose. However, instrumental studies analyzing its psychometric properties are scarce, and validity evidence is limited and based solely on its relationship to other future perspective scales. In addition, measurement invariance across gender has yet to be examined. Although Zaleski (1996) found that scores on the FAS correlated with personality traits such as neuroticism, there is no published evidence of this association with DFS scores. Further studies are therefore warranted to provide more evidence for their reliability and validity. Another issue to consider, with regard to our cultural context, is that there is currently no validated Spanish version of the DFS.

In light of the above, the aim of the present study was to develop and validate a Spanish version of the DFS (hereinaf-

ter, the DFS-S), providing evidence of its psychometric properties in a sample of young adults. The process of adapting the DFS was carried out in accordance with the Standards for Educational and Psychological Testing (American Educational Research Association et al., 2014) and the recommendations of the International Test Commission (2017). First, confirmatory factor analysis was used to provide validity evidence based on the instrument's internal structure, including measurement invariance across gender. We then examined item homogeneity, the reliability of test scores, and obtained validity evidence based on the relationship with other variables. Given that some people have a predisposition to react with fear to a variety of life situations and that personality traits are postulated to be the basis of future anxiety (Zaleski, 1996; Zaleski et al., 2019), we sought to obtain validity evidence based on the correlation between DFS-S scores and scores on the five core personality factors: extraversion, agreeableness, conscientiousness, neuroticism, and openness. Our main expectation here was that DFS-S scores would be positively associated with scores on neuroticism. Finally, gender differences in DFS-S scores were examined. In accordance with Zaleski et al. (2019), we expected DFS-S scores to be higher among females.

Material and Method

Participants

The sample consisted of 1,019 young adults (434 males and 585 females) aged between 18 and 24 years ($M = 20.19$, $SD = 1.62$). They were all undergraduates at the University of Malaga (Spain) and were enrolled in study programs relating to different areas of knowledge. The large majority were single (99.8%) and not in work alongside their studies (87.3%).

Instruments

Dark Future Scale (DFS; Zaleski et al., 2019). The DFS assesses future anxiety and consists of 5 items, each rated on a 7-point Likert-type scale anchored by 0 (*decidedly false*) to 6 (*decidedly true*), with higher scores indicating a greater concern about the future. A Spanish version of the scale was developed using the back translation method, in accordance with the recommendations of the International Test Commission (2017). After first obtaining permission from the scale's authors to adapt the DFS for use in the Spanish population, the original instrument was translated by two professional translators who were both native speakers of Spanish. The research team then reviewed the Spanish version and, together with the translators, assessed the equivalence of the English and Spanish versions. The translation and adaptation process considered linguistic, psychological, and cultural differences in the Spanish population. Each of the item statements was systematically reviewed until a consensus was reached. The Spanish version was then translated back into

English by a native speaker of English. Finally, the research team compared the two English versions to ensure semantic and conceptual equivalence.

International Personality Item Pool–Big Five Markers-20 (IPIP-BFM-20; Donnellan et al., 2006; Goldberg, 1999), in its Spanish version (Martínez-Molina & Arias, 2018). This instrument assesses five personality factors (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness) through a total of 20 items, each rated on a 5-point Likert-type scale from 1 (*very inaccurate as a description of you*) to 5 (*very accurate as a description*). Individuals who score high on the respective factors may be described as active, assertive, talkative (extraversion); trustful, kind, helpful (agreeableness); organized, diligent, efficient (conscientiousness); anxious, nervous, prone to anger and irritation (neuroticism); and cognitively open, creative, introspective (openness). By contrast, those who score low may be described as introverted, reserved, quiet (extraversion); distrustful, selfish, rude (agreeableness); unsystematic, unconcerned with order and planning, negligent (conscientiousness); relaxed, calm, imperturbable (neuroticism); and unintellectual, unimaginative, unreflective (openness). Cronbach's alpha coefficients in the present sample were .79, .73, .72, .69, and .60 for extraversion, agreeableness, conscientiousness, neuroticism, and openness, respectively.

Procedure

The study procedures were carried out in accordance with the Declaration of Helsinki and were approved by the Experimentation Ethics Committee of the University of Malaga. A convenience sampling strategy was used. Participants completed an online survey comprising the aforementioned instruments, which they accessed through the open learning platform of the university's website. They were all informed of the purpose of the study and it was made clear that responses were anonymous and would be used solely for research purposes. All participants provided informed consent prior to any data collection, which included confirmation that they were aged 18 or over. They received no financial remuneration for their participation. The survey took around 10 minutes to complete. There were no missing data because the survey could not be submitted unless all questions had been answered.

Data analysis

We first conducted a descriptive analysis of DFS-S item scores, using IBM SPSS 28 to compute means, standard deviations, and skewness and kurtosis coefficients. Next, and in order to obtain validity evidence based on the internal structure of the DFS-S, we tested a single-factor structure through confirmatory factor analysis (CFA), performed using the R program with lavaan package (Rosseel, 2012). All CFA analyses were performed using the polychoric correlation matrix of items and the diagonally weighted least squares (DWLS) estimation method, which has been shown

to provide accurate parameter estimates when dealing with categorical items (Li, 2016; Míndrilă, 2010). To assess model fit, we computed the chi-square statistic (χ^2), along with the following goodness-of-fit indices: the comparative fit index (CFI), the non-normed fit index (NNFI), the root mean square error of approximation (RMSEA), and the standardized root mean squared residual (SRMR). Values of the CFI and the NNFI close to or above .95 are generally considered a good fit (Hu & Bentler, 1999). Values of the RMSEA between .06 and .08 indicate a reasonable fit (Browne & Cudeck, 1993; MacCallum et al., 1996), and those below .06 a good fit (Hu & Bentler, 1999). Values of the SRMR close to .08 suggest a good fit (Hu & Bentler, 1999).

Configural, metric, and scalar invariance were also analyzed to establish whether the number of factors and their factor loading coefficients were equal across genders, and to test whether the comparison of factor means across groups was permissible (Dimitrov, 2010; Han et al., 2019). Invariance was tested by fitting a series of nested CFA models with increasing constraints, following the procedure suggested by Byrne (2008). The process began by determining the baseline model for each group (male and female) separately. We then tested the configural and metric invariance by constraining, respectively, the factor structure and the factor loadings to be equal across gender. Scalar invariance was examined by introducing equal thresholds across groups. Invariance was considered tenable if the decrease in CFI was less than or equal to .01 and if the increase in RMSEA was less than or equal to .015 when comparing configural to metric, and metric to scalar invariance models (Chen, 2007; Cheung & Rensvold, 2002).

In a third step we analyzed item homogeneity by calculating corrected item-total correlation coefficients, considering values above .30 as satisfactory (De Vaus, 2002). The reliability of DFS-S scores was also examined by computing McDonald's omega coefficient, for which values of .70 or higher are generally considered acceptable (Campo-Arias & Oviedo, 2008; Viladrich et al., 2017).

In order to obtain validity evidence based on the relationship with other variables, we then calculated Pearson correlation coefficients between DFS-S scores and scores on the IPIP-BFM-20 subscales (extraversion, agreeableness, conscientiousness, neuroticism, and openness). In accordance with Cohen's (1988) criteria, values around $|.10|$, $|.30|$, and $|.50|$ were considered as indicating small, moderate, and strong correlations, respectively.

Finally, gender differences in DFS-S scores were examined using Welch's *t*-test for independent samples.

Results

Descriptive Item Statistics

Table 1 displays mean scores, standard deviations, and skewness and kurtosis coefficients for DFS-S items. Some items showed slight deviation from the normal distribution.

Table 1

Mean score (M), standard deviation (SD), skewness, and kurtosis for DFS-S items, and corrected item-total correlations (N = 1019)

Items	M	SD	Skewness	Kurtosis	Item-total correlation
1. I am afraid that the problems which trouble me now will continue for a long time [Temo que los problemas que me preocupan ahora continúen durante mucho tiempo]	4.05	1.95	-0.73	-0.65	.67
2. I am terrified by the thought that I might sometimes face life's crises or difficulties [Me atemoriza pensar que tendré que hacer frente a crisis o problemas en mi vida]	3.53	2.04	-0.35	-1.15	.76
3. I am afraid that in the future my life will change for the worse [Me preocupa que en el futuro mi vida cambie a peor]	4.01	2.00	-0.72	-0.75	.81
4. I am afraid that changes in the economic and political situation will threaten my future [Me preocupa que los cambios en la situación económica o política amenacen mi futuro]	4.50	1.82	-1.16	0.26	.65
5. I am disturbed by the thought that in the future I won't be able to realize my goals [Me inquieta el pensamiento de que en el futuro no seré capaz de alcanzar mis metas]	4.08	2.04	-0.78	-0.70	.73

Validity Evidence Based on Internal Structure

A CFA was first conducted with the total sample to examine the fit of the single-factor model of the DFS-S. The indices obtained indicated a good fit, with values of the CFI and NNFI above .95, the RMSEA below .06, and the SRMR below .08. We then tested the fit of the model for males and females separately. Both models yielded reasonable fit indi-

ces. Finally, the analysis of configural, metric, and scalar invariance also indicated a good fit, insofar as there was a decrement of less than .01 in the CFI and an increment of less than .015 in the RMSEA from the less constrained to the more constrained model (Table 2). The values of standardized parameters for the total sample were all statistically significant (Figure 1).

Table 2

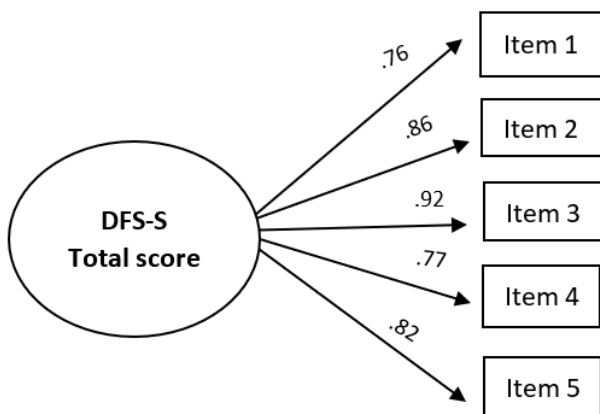
Fit indices for the single-factor model of the DFS-S

Model	χ^2	df	CFI	NNFI	RMSEA [CI]	SRMR	∇ CFI	Δ RMSEA
Total sample	10.80	5	.999	.999	.034 [.001, .020]	.016		
Female	10.28	5	.999	.999	.043 [.001, .080]	.024		
Male	3.76	5	.999	.999	.001 [.001, .058]	.013		
Configural	14.04	10	.999	.999	.028 [.001, .060]	.019		
Metric	24.72	14	.999	.999	.039 [.009, .063]	.025	<.01	<.015
Scalar	40.39	38	.999	.999	.011 [.001, .034]	.022	<.01	<.015

Note. N = 1019; Female, n = 585; Male, n = 434; χ^2 = chi-square statistic; df = degrees of freedom; CFI = comparative fit index; NNFI = non-normed fit index; RMSEA = root mean square error of approximation with 90% confidence interval, ∇ CFI = CFI less constrained model – CFI more constrained model; Δ RMSEA = RMSEA less constrained model – RMSEA more constrained model.

Figure 1

Standardized parameter values for the single-factor structure of the DFS-S for the total sample



Item Analysis and Reliability

Corrected item-total correlations in the total sample ranged from .65 to .81 (Table 1). All values were therefore above .30, indicating adequate item homogeneity. Regarding the reliability of DFS-S scores, the values of McDonald's omega coefficient were .92 for the total sample, .93 for males, and .90 for females, indicating satisfactory and similar reliability of test scores.

Validity Evidence Based on Relationships with Other Variables

The results of the correlation analysis showed that scores on the DFS-S were positively related with scores on agreeableness, neuroticism, and openness, and negatively related with scores on extraversion and conscientiousness. However, only the associations with neuroticism and extraversion were strong or moderate. The other associations were weak according to Cohen's criteria (Table 3).

Table 3

Pearson correlation coefficients between DFS-S total score and scores on the IPIP-BFM-20 subscales

IPIP-BFM-20	DFS-S
Extraversion	-.25***
Agreeableness	.14***
Conscientiousness	-.13***
Neuroticism	.42***
Openness	.08*

Note. $N = 1019$. *** $p < .001$, * $p < .05$.

DFS-S Scores and Gender Differences

The total score on the DFS-S ranges from 0 to 30 and is calculated by summing scores for all 5 items (each rated from 0 to 6). The mean in the present sample was 20.17 ($SD = 8.21$), with skewness and kurtosis coefficients equal to -0.69 and -0.42, respectively. Female participants ($M = 21.31$; $SD = 7.56$) scored significantly higher than males ($M = 18.64$; $SD = 8.77$), $t(850.09) = 5.09$, $p < .001$, with a moderate effect size ($d = 0.33$).

Discussion and Conclusions

The aim of this study was to develop a Spanish version of the DFS (DFS-S) and to provide evidence of its psychometric properties in a sample of young adults. Validity evidence based on the instrument's internal structure, including measurement invariance across gender, as well as on relationships with personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) was obtained. Reliability and gender differences in DFS-S scores were also examined.

With regard to validity evidence based on internal structure, the results of the CFA supported, as expected, a single-factor structure for the DFS-S, with satisfactory fit indices. This structure is consistent with that reported by Zaleski et al. (2019) for the original version of the scale and it supports the use of the total score, with higher scores indicating a greater concern about the future. We also found configural, metric, and scalar invariance across gender, indicating that the DFS-S has a stable factor structure and the same measurement units and origins across male and female young adults. These results also indicate that latent factor means can be compared between these two groups and that potential differences in latent factors reflect true differences on the construct (Dimitrov, 2010; Han et al., 2019).

Regarding item analysis, item-total correlation coefficients indicated satisfactory item homogeneity, with values above or equal to .65. The reliability of DFS-S scores was also adequate, with McDonald's omega equal to .92, similar to the Cronbach's alpha coefficient of .90 obtained with the original version (Zaleski et al., 2019).

In terms of validity evidence based on relationships with other variables, the analysis showed that DFS-S scores correlated with scores on the IPIP-BFM-20 subscales. Overall, the most relevant findings were the strong positive correla-

tion between future anxiety and neuroticism, as expected, and the moderate negative correlation with extraversion. The neuroticism subscale encompasses the facets of anxiety, depression, and anger, whereas the extraversion subscale captures the facets of cheerfulness and friendliness. These results therefore suggest that people who are anxious, nervous, and prone to anger and irritation, as well as those who are introverted, reserved, and socially inhibited tend to think about the future with anxiety, fear, and uncertainty. Although there is no previous evidence regarding the relationship between personality traits and future anxiety as measured by the DFS, our findings are consistent with studies using the Future Anxiety Scale (Zaleski, 1996), in which a positive correlation was observed between neuroticism and future anxiety. They are also in line with the results of Stolarski and Matthews (2016), who found that scores on the Future Negative scale (Carelli et al., 2011) showed a particularly strong relationship with neuroticism. Mention should likewise be made of the empirical evidence showing that individuals who score high on neuroticism are more vulnerable to anxiety disorders, depression, and obsessions, and also that the combination of high neuroticism with low extraversion is associated with stress vulnerability, anxiety, and depressive disorders (Grant, 2011; Rosellini & Brown, 2011; Wenjuan et al., 2020). Overall, our results suggest that the DFS-S may be useful in clinical settings to determine future anxiety, which in turn could be important for identifying individuals at potential risk of high levels of stress, anxiety or depression. However, more research is needed on the relationship between future anxiety and mental health.

The mean total score on the DFS-S in the present sample was 20.17 (out of a maximum possible of 30), with negative skewness, indicating that the distribution is concentrated on high scores. These results suggest that young Spanish adults are generally concerned about the future, which is consistent with recent reports for other countries (Dadaczynski et al., 2021; Lanz et al., 2021). In line with our expectations and with other studies using the DFS (Dadaczynski et al., 2021; Duplaga & Grysztar, 2021; Zaleski et al., 2019), we also found higher levels of future anxiety among female participants. Empirical research has consistently shown that women are more susceptible than men to developing anxiety (Marques et al., 2016), with some authors attributing this to a combination of social and biological factors (Hantsoo & Epperson, 2017). Women are more likely than men to experience stressors and tend to use different coping strategies, and this, coupled with certain biological mechanisms, including hormonal fluctuation, may make them more vulnerable to anxiety disorders (Faravelli et al., 2013; Graves et al., 2021; Hantsoo & Epperson, 2017; Marques et al., 2016). Overall, these results suggest the need to make psychological counseling available to young adults, especially for women, so as to teach them specific skills for managing and reducing anxiety about the future, thus improving their general well-being.

The present study has a number of limitations that need to be mentioned. First, the generalizability of results may be limited by our use of a convenience sampling strategy, as well as by the focus on young adults. Hence it would be interesting in further research to consider a wider age range and to analyze measurement invariance across stages of adulthood. Second, data were collected using self-report instruments, which can be affected by response bias. Third, test-retest reliability was not analyzed, and future research should provide information on this aspect. Fourth, the use of correlational analysis to examine relationships between variables means that causality cannot be inferred. Finally, validity evidence based on the relationship with other variables was only provided by means of associations with personality traits. Although personality traits have been considered the basis of future anxiety (Zaleski, 1996, 2005; Zaleski et al., 2019), it would be interesting in future research to study the relationship between future anxiety and mental health problems such as stress or depression. The association between future anxiety and scores on other scales designed specifically to assess anxiety also needs to be established so as to analyze relationships with similar constructs.

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