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ORIGINAL RESEARCH

Development and Psychometric Properties of Work Information Anxiety Questionnaire

Zhanmei Song[1],*, Jiayang Ye[2],*, Xudong Song [ID][3], Zheng Zhang [ID][4], Peiyun Xu[5], Hongmei Shen[6]

[1]College of International Education, Wenzhou University, Wenzhou, People's Republic of China; [2]College of Education, Wenzhou University, Wenzhou, People's Republic of China; [3]School of Public Administration and Policy, Renmin University of China, Beijing, People's Republic of China; [4]Department of Psychiatry, the Second Xiangya Hospital of Central South University, National Center for Mental Disorders, and National Clinical Research Center for Mental Disorders, Changsha, People's Republic of China; [5]School of Public Affairs, Zhejiang University, Hangzhou, People's Republic of China; [6]School of Public Administration, Beihang University, Beijing, People's Republic of China

*These authors contributed equally to this work

Correspondence: Xudong Song, School of Public Administration and Policy, Renmin University of China, No. 59 Zhongguancun Street, Haidian District, Beijing, 100872, People's Republic of China, Tel +86 18001057285, Email psyamsong@ruc.edu.cn; Zheng Zhang, Department of Psychiatry, Second Xiangya Hospital, Central South University, 139 Renmin Middle Road, Changsha City, Hunan Province, 410011, People's Republic of China, Tel +8617806172110, Email hldzzz@foxmail.com

Purpose: The purpose of this study is to develop and validate the Work Information Anxiety Questionnaire (WIAQ), and to report on the psychometric properties of the WIAQ.

Methods: Based on the Approach-Avoidance Conflict theory, and combining previous literature reviews and open-ended interviews, initial scale items for the Work Information Anxiety Questionnaire were developed. Using 324 full-time corporate employees as subjects (Sample 1), an exploratory structural examination of work information anxiety was conducted, including item analysis, exploratory factor analysis, and network analysis. An additional 210 corporate employees were selected for formal testing (Sample 2), and the obtained data underwent structural validation, including confirmatory factor analysis, validity testing, and reliability testing.

Results: The WIAQ (9 items) exhibited a two-factor structure of reception anxiety and missing out anxiety, with a cumulative variance contribution rate of 67.56%. The confirmatory factor model showed good model fit, with cross-group and cross-measurement stability. The Cronbach's α of the WIAQ was 0.899, and the McDonald's ω of the two factors were 0.906 and 0.831 respectively. The WIAQ demonstrated good criterion-related validity with the SAS and DASS.

Conclusion: The factor structure of the WIAQ is clear, and its reliability and validity indicators meet psychometric requirements. It can serve as an effective tool for measuring work information anxiety.

Keywords: work information anxiety, reception anxiety, missing out anxiety, approach-avoidance conflict theory, network analysis

Introduction

Anxiety is a common psychological and mental disorder that causes individual psychological distress and social cost waste.[1] There is increasing evidence that the workplace may be an important cause of anxiety psychological problems and anxiety mental disorders. A large amount of research that discusses topics highly correlated with workplace anxiety has been conducted, including discussions of work stress, work burnout, or work load.[2–4] However, the development of workplace anxiety research is not keeping pace with it. In a standardized diagnostic interview survey of 132 hospitalized anxiety disorder patients, 71% of females and 54% of males complained of work-related anxiety.[5] Additionally, a recent study compared anxiety levels between working and non-working mothers, and found significant differences in depression and anxiety levels between the two groups, with higher levels in the working group.[6] Accordingly, workplace anxiety is increasingly becoming an important issue in occupational mental health and psychiatry, and relevant new research developments are urgently needed.

In recent years, due to the rapid development of modern digital information technology and the intensifying competition among enterprises, workplace anxiety has shown emerging research topics featuring "informationization"

as an important characteristic. The modern work environment is increasingly facing massive and diverse information inputs, including information reception-transmission and interpersonal communication in the workplace, and relies more and more on instant messaging devices and software to convey work-related information.[7] Individuals in the workplace need to process and cope with work-related information from various channels in their work, such as emails, online documents, social media and instant messaging tools. However, the dramatic growth and constant changes of such information have brought new challenges and pressures to individuals, thus leading to the emergence of work information anxiety. At present, relevant evidence has shown that individuals' long-term exposure to high-intensity work information stimuli is likely to affect physical and mental health, resulting in negative consequences including psychological anxiety, stress, psychological stress, and learned helplessness.[8,9] Even when facing work information, many psychological discomforts and avoidance behaviors can occur.[10,11] Accordingly, work information anxiety, as a concept closely related to employees' mental health, career development, and work performance, has attracted extensive attention in academia and practice.[12]

However, despite the increasing importance and impact of work information anxiety, in-depth understanding and systematic measurement of it is still relatively limited. Work information anxiety is different from general psychological anxiety and has unique characteristics in the workplace and the information age. Currently, researchers' relevant studies on work information anxiety are still based on manifestations of general psychological anxiety in the workplace. Relevant research results are scattered among similar concepts such as "workplace-related anxiety" and "job-related anxiety".[5,13] Essentially these studies do not directly target work information anxiety itself. In summary, the issue of work information anxiety still lacks a targeted, reliable and effective scale tool, which has become a limiting factor for relevant research and practical interventions. Therefore, the goal of this study is to clarify the concept and dimensions of work information anxiety based on previous research, and develop an effective and reliable work information anxiety scale to provide insights and references for future research in fields such as occupational mental health, psychological anxiety, and intervention strategies.

The Concept of Work Information Anxiety

Work information refers to various information related to work that employees receive in the workplace, including work content and requirements, work contacts with leaders and colleagues, office information, work instructions, etc. The concept of work information anxiety originates from job-related anxiety, workplace-related anxiety, etc.[5,13] The concept of work information anxiety is developed on the basis of previous research on work stress and work anxiety. In terms of measurements of work anxiety, Parker & DeCotiis developed a work stress model from the perspective of organizational work stress, proposing that work anxiety is a common stress response, and that work stress has two different dimensions: time pressure and work anxiety. The measurement of work anxiety mainly depicts individuals' subjective feelings in response to work stressors (eg fidgety, nervous, etc.).[14] McCarthy & Goffin developed the workplace anxiety scale, which focuses on anxiety about job performance in the workplace.[15] Similar studies do not directly target work information anxiety itself, and less describe individuals' "uncomfortable reactions" to environmental stimuli.[16] Jensen et al developed a work anxiety scale mainly measuring work anxiety from the perspective of individual emotional manifestations, such as tension, anxiety, panic, fear, etc.[17] Workplace stimuli present new characteristics in the information age, but existing measurements of work anxiety cannot accurately capture the new requirements of "work information".

When dealing with such workplace anxiety, researchers have found that "information" may be one of the overlooked causes of employee anxiety. For example, De Clercq, Haq & Azeem found that employees' self-efficacy can reduce job-related anxiety emotions, mainly because self-efficacy inspires employees' confidence in dealing with information deficiency.[13] In the workplace, not only information deficiency causes problems. Bawden & Robinson pointed out the concept of information overload - having too much information at hand, plus various forms and channels for communication, can lead to psychological problems caused by information overload, including information obesity, information avoidance, information anxiety, etc.[7] In addition, Valentino et al also paid special attention to the interaction between anxiety and information utility, and believed that information anxiety may have driven behaviors, but would not simply promote any information seeking behavior.[18] Luebbe et al emphasized the impact of social information processing (SIP)

on anxiety and depressive symptoms, and found that both anxiety and depression were associated with more conflicted information processing.[19]

Based on this, we believe that work information anxiety is different from general psychological anxiety and has unique characteristics in the workplace and the information age. In the workplace, work information anxiety is a common psychological conflict state. It is a comprehensive process involving stress emotions, anticipated cognitions, and behavioral reactions when faced with work-related information in the work environment. This is also supported by the Theory of Workplace Anxiety (TWA).[20,21] Employee anxiety triggered by work information is a comprehensive reflection process of "information reception - anticipated cognition - behavior", with two seemingly contradictory motivations and behavioral outcomes - avoiding work information on one hand and promoting information seeking behavior on the other.

The Theory of Approach-Avoidance Conflict

The approach-avoidance conflict theory is an important theory for explaining the formation path of individual behavioral tendencies. Approach and avoidance are the most important driving forces of human behavior when external stimuli are present, and they also represent two basic reaction patterns.[22] Among them, the approach reaction is the attitude and tendency of an individual to approach the source of stimulation, while the avoidance reaction is the opposite. Approach-avoidance plays an important driving role in human functional activities, and the occupational behavioral field is no exception.[23] It is usually seen as a "core element of organizational behavior".

In addition, the approach-avoidance conflict theory has long been seen as one of the important theories for explaining individual psychological anxiety. The theory believes that when an individual faces a target that they both want to approach and avoid, there is a conflict between their internal motivations, which leads to the generation of anxiety emotions.[24] A large number of empirical studies have confirmed that approach-avoidance conflicts are widespread in various anxiety disorders such as social anxiety and agoraphobia.[25,26] Specifically, anxious individuals desire to participate in social activities and improve interpersonal relationships, but they also tend to avoid these activities to avoid anxiety.[27] This approach-avoidance conflict exacerbates individuals' anxious reactions and negative emotional experiences. Based on this theoretical framework, clinical experts have developed various methods to treat anxiety, such as alleviating anxious reactions by mediating the individual's inner approach-avoidance motivational conflict;[28] or using third-wave cognitive behavioral therapies such as mindfulness therapy to treat anxiety by cultivating the individual's acceptance and removal of judgement towards inner conflicts.[29] In summary, the approach-avoidance conflict theory provides an important theoretical basis for the cognitive-behavioral school to understand and treat anxiety disorders, and has demonstrated powerful explanatory power and therapeutic effects in the clinical application of anxiety.[30–32]

Dimensions of Work Information Anxiety and Approach-Avoidance Mechanism

Work information anxiety is a prevalent type of anxiety stemming from the stress and frustration individuals experience when dealing with work information.[7] When facing work information anxiety, individuals may exhibit reception anxiety and missing out anxiety towards work information. Among them, information reception anxiety refers to the anxiety and unease emotions felt by individuals when dealing with stressors like information overload or time pressure at work. Bawden & Robinson believe that information anxiety is a state of stress when one cannot access, understand or utilize necessary information.[7] In the information age, the amount of information people receive grows geometrically, but faced with such a huge amount of information, the brain's central processor cannot decompose and digest it in time. People's thinking patterns are far from developing to the point of receiving and using information freely, thus causing a series of phobias or self-compulsion. This symptom is called information anxiety disorder, often accompanied by anxiety, irritability, and fear of negative impacts on work and life, triggering physical and psychological reactions such as insomnia, headache, and loss of appetite. Information anxiety disorder is a psychosomatic disorder that can cause a series of self-compulsion and tension, so it is also called knowledge anxiety syndrome.[33] The influencing factors and mechanisms of information anxiety in the workplace are diverse. In the workplace, most information exchange is done through communication devices. With the continuous increase in the amount of information and the real-time requirement of information processing, employees' pressure to deal with work information has increased sharply.[19]

Studies show that work information anxiety may stem from information overload, time pressure, or disturbance from complex information.[7] Wang et al found that information overload on enterprise social media was significantly positively correlated with employees' workplace anxiety.[34] Employees feel unable to effectively process such information, leading to work information anxiety. Information reception refers to the process of an individual receiving, processing and understanding information in a work environment.[35] According to approach-avoidance conflict theory, if the threshold of information reception that an individual can bear is exceeded, employees tend to avoid activities related to work information in order to alleviate these unpleasant emotions and stresses. Studies show that in work information anxiety, individuals may adopt information avoidance behaviors, such as avoiding actively seeking or dealing with large amounts of work information, in order to reduce anxiety.[10,11] On the other hand, the theoretical explanation of work information reception anxiety is validated by the perspective of cognitive load theory (CLT). CLT proposes that people need to conduct cognitive processing activities that consume certain cognitive resources in order to understand or solve problems. However, according to resource limitation and schema theory, the cognitive structure of the human brain consists of storage units, and the capacity of cognitive resources is limited.[36] Therefore, when there is excessive information to process at work, or when processing a piece of information requires cognitive resources exceeding individuals' total cognitive resources, it will lead to cognitive load. The stress of this cognitive load will induce employees to engage in information avoidance behaviors at work.

In the work environment, research on work information anxiety has gradually gained interest. Budnick et al referred to work information anxiety as fear of missing out (FoMO), and believed that workplace FoMO is a potential, prevalent and influential phenomenon.[37] Based on work contexts, Przybylski et al first defined work information anxiety as the anxiety employees feel about missing valuable career opportunities when disengaging or disconnecting from work, which was the first study of missing out anxiety in the workplace.[38] Through experimental research, Fitz et al found that compared to groups receiving normal notifications and bulk notifications, group members who did not receive any notifications exhibited higher degrees of missing out anxiety.[39] In addition, Shi et al studied employees' missing out anxiety in the Chinese workplace, believing that work information anxiety is a kind of generalized anxiety employees feel due to worrying and fearing that they are missing useful information, social relationships, career development opportunities, and work benefits that are useful for their work.[40] In discussing the influencing factors and mechanisms of action of missing out anxiety at work, existing research has found that the Big Five personality traits,[41–43] basic psychological needs,[32,39] social needs,[44] sense of belonging and other factors can lead to missing out anxiety.[45] Budnick et al believe that missing out anxiety in the workplace mainly comes from interpersonal relationships and valuable information itself in the workplace.[37] Accordingly, the approach-avoidance conflict theory is a suitable mechanism for explanation. The cognition behind the information is an important cognitive mechanism leading to work information anxiety. Among them, information anticipated cognition refers to an individual's expectations and evaluations of information at work. In work information anxiety, individuals may develop generalized anxiety about missing important instructions from leaders, useful work information, social relationships and career development opportunities, and work benefits, and exhibit corresponding behavioral manifestations. Existing research has confirmed that employees' missing out anxiety increases work information checking behaviors.[37] Even during non-working hours, they compulsively check work information through portable communication devices, leading to work interfering with family, which in turn exacerbates work-family conflict.[46,47] On the other hand, the theoretical explanation of work information reception anxiety is validated by the perspective of conservation of resources theory (COR). COR proposes that people are motivated to obtain, maintain, foster, and protect resources they value, and individuals make corresponding psychological and behavioral responses to both resource gains and losses.[48] According to COR theory, when employees face important work information in their job, they would perceive potential loss of resources or threats to resource loss if they do not understand the information. This will lead to work information reception anxiety, and prompt approach behaviors towards the information to compensate for the loss.

According to the Approach-Avoidance Conflict Theory, work information anxiety may be caused by the conflict between employees' inner motivations to approach and avoid.[49] On one hand, employees want to proactively acquire all kinds of work information in order to better complete work tasks and get promoted in the organization (approach motivation).[50] But on the other hand, faced with massive amounts of work information, employees may feel stressed and

overwhelmed, worrying that they cannot process all this information effectively, thus generating the tendency to avoid work information (avoidance motivation).[49] This conflict between the motivation to acquire and avoid information can lead to employee anxiety.[19] Specifically, reception anxiety refers to employees' stressful and tense reactions when facing large amounts of work information.[21] Missing out anxiety stems from employees' anxiety about missing important information due to information overload, leading to adverse consequences and the avoidance behavior itself also becomes a negative feedback for anxiety.[49] Individuals may avoid tasks related to work information, such as reading, processing or searching for work-related information, in order to alleviate anxious emotions and stress. Although avoidance behaviors may be an individual's attempt to protect themselves from the effects of anxiety emotions, they can also have negative impacts on work performance and information acquisition abilities. Organizations can help employees regulate such motivational conflicts and reduce work information anxiety by providing information support, reducing information overload, etc.[7,50] In summary, although the causes of work information anxiety are complex and need to be further studied in combination with other psychological theories, the Approach-Avoidance Conflict Theory provides researchers with an important perspective that is insightful and helpful for understanding and dealing with work information anxiety.[20]

Current Study

Based on the above, this study discusses the similarities and differences between work information anxiety and concepts like general psychological anxiety and psychological anxiety in the workplace, building on previous research. Next, we describe the approach-avoidance conflict theory and propose possible dimensions of work information anxiety based on it. The research idea going forward is to develop and validate a Work Information Anxiety Questionnaire (WIAQ). Through studying previous literature and open-ended focused interviews with some participants with high work information anxiety, exploratory factor analysis, network analysis, and confirmatory factor analysis are used to determine and validate the dimensions of work information anxiety. Finally, the reliability and validity of this scale will be reported. The WIAQ will provide researchers with a tool to accurately measure individuals' levels of work information anxiety. It will also serve as an effective assessment tool for practitioners to identify work information anxiety problems in the workplace.

Methods

Participants

We used the G*Power software to estimate the sample size.[51] With a standard error of 0.05, an effect size of 0.2, at least 193 samples are needed. Considering potential sample loss, in actual sampling, we tried to collect over 200 samples to obtain relatively reliable data analysis results.

Sample 1: convenience sampling, initial survey questionnaires were distributed in 5 Internet and e-commerce companies in Wenzhou, Zhejiang Province, and 324 valid questionnaires were collected. Among them, 26.85% were male and 71.91% were female, with 1.23% as other; 2.47% had middle school education or below, 4.94% had high school or secondary school education, 12.35% had college education, 51.54% had bachelor's degree, and 28.70% had graduate degree or above. Questionnaires were distributed and data collected via the online survey platform Questionnaire Star. After completing the questionnaire, participants were given monetary compensation. This sample was used for questionnaire item analysis, parallel analysis, and exploratory factor analysis.

Sample 2: convenience sampling, 3 other Internet companies were selected in Zhejiang Province. Questionnaires were distributed and data collected via Questionnaire Star, with 210 valid questionnaires received. Among them, 21.8% were male and 78.2% were female; 0.95% had middle school education or below, 1.9% had high school or secondary school education, 11.37% had college education, 61.14% had bachelor's degree, and 24.64% had graduate degree or above. After completing the questionnaire, participants were given monetary compensation. This sample was used for confirmatory factor analysis, reliability testing, and analysis of criterion-related validity.

Questionnaire Items

Work Information Anxiety Questionnaire (WIAQ)

This study used literature review and open-ended interviews to design the initial Work Information Anxiety Questionnaire (WIAQ). First, the author systematically reviewed previous literature on work stress, anxiety in the workplace, information overload, and missing out psychology. Second, to understand the real feelings of employees experiencing work information anxiety and enrich the questionnaire, in-depth interviews were conducted with 10 corporate employees. The interviewees included 6 females and 4 males aged between 20–30 years old, all with undergraduate education or above. The critical incident technique was used, asking interview participants to recall scenarios when they felt work information anxiety in the workplace, and focus on describing their psychological feelings, thoughts, and specific behaviors at that time. Through the above two steps, we obtained the initial interview texts about work information anxiety. We organized graduate students to code the initial interview texts, mainly to identify descriptions of experiencing work information anxiety, including some feelings, behavioral performances, etc. We consolidated contents with similar meanings but slightly different expressions. By frequency statistics of these coding results, we extracted 22 coding results of psychological feelings and behavioral performances with higher frequencies, initially forming a 22-item preliminary questionnaire, and preliminarily constructed two main dimensions of work information anxiety: work information reception anxiety and missing out anxiety.

Next, to further refine the WIAQ items, we invited 5 senior experts in occupational psychology and psychological anxiety for a focused group interview. The core concepts of work information anxiety were first introduced to the experts, followed by a detailed introduction of the meaning of the initially identified dimensions and indicators. The interview focused on the rationality and relevance of the model and items, ie whether it was reasonable to use these 22 indicators to measure the degree of work information anxiety, and whether the summarized two dimensions were appropriate, and whether some items needed to be added or deleted. Based on expert feedback, the following modifications were made: First, some items were not applicable to work information reception and missing out anxiety. Thus, 7 items were removed from the original questionnaire. Second, since this study focuses on the psychological anxiety of information reception and missing out, many items involving avoidance behaviors in the initial questionnaire were not suitable to be mixed with other items. Hence, another 5 items directly related to avoidance behaviors were further removed.

Finally, 10 items were retained from the initial questionnaire (item5, 7, 8, 11, 12, 13, 14, 15, 16, 17) to form the initial WIAQ. As shown in Table 1, this questionnaire has 10 items, including two dimensions of work information reception anxiety and work information missing out anxiety. The information reception dimension has 5 items, and the information missing out dimension has 5 items. A 5-point scale was used, with 1 being "strongly disagree", 2 being "disagree", 3 being "neutral", 4 being "agree", and 5 being "strongly agree". Higher scores indicate more severe work information anxiety. Participants' gender, age and education level were also measured.

Self-Rating Anxiety Scale (SAS)

The Self-Rating Anxiety Scale (SAS) compiled by Zung is a fairly simple clinical tool for analyzing patients' subjective symptoms.[57] It is applicable to adults with anxiety symptoms and has wide applicability. Foreign research believes that the SAS can better reflect the subjective feelings of psychiatric help seekers with anxiety tendencies. There are 20 items, each scored on a 1–4 Likert scale. "1" indicates none or a little of the time; "2" indicates some of the time; "3" indicates a good part of the time; "4" indicates most or all of the time. Based on the scoring criteria, standard scores of 50–59 indicate mild anxiety, 60–69 indicate moderate anxiety, and >70 indicate severe anxiety. 15 of the 20 items are stated in negative words and scored according to the above 1–4 sequence. The other 5 items (5, 9, 13, 17, 19) are stated in positive words and reverse scored from 4 to 1.

Depression Anxiety and Stress Scale (DASS)

The Depression Anxiety Stress Scale (DASS) developed by Lovibond & Lovibond was adopted.[54] This is a commonly used psychological measurement tool that can help people assess their emotional states. Given that the theme of this study is work information anxiety, the Depression and Anxiety dimensions of the DASS-21 scale were adopted. Each dimension has 7 items, 14 items in total.

Table 1 Questionnaire Items and Supporting Literatures

Original Item Number	Items	Supporting Literature (Original)
Reception anxiety		
Item7	I feel nervous when I receive work information.	Cruise, Case, and Bolton;[52] Vignoli et al[21]
Item8	I feel annoyed when I receive work information.	
Item11	I feel scared when I receive work information.	
Item12	When I receive work information, I always feel that there is a new job for me.	Linden and Muschalla;[5] De Clercq, Haq and Azeem[13]
Item13	When I receive work information, I worry about interference with what I am doing.	Cohen, Kamarch, and Mermelstein[53]
Missing out anxiety		
Item5	Missing work information causes me a psychological burden.	Lovibond and Lovibond;[54] Antony et al[55]
Item14	I feel my cell phone vibrating/ringing but realize there is no work message.	Cheng and McCarthy[20]
Item15	I would not be able to stop wondering if there was a new work message.	Richardson and Benbunan-Fich[46]
Item16	Every once in a while, I would check to see if there was any new work information.	Budnick et al[37]
Item17	I would feel uneasy whenever I did not receive work information for a period of time.	Clark and Watson;[56] Budnick et al[37]

Statistical Analyses

The statistical analysis mainly includes three parts. The first part is to explore the structure of the WIAQ, mainly using item analysis, exploratory factor analysis, and network analysis. The second part is to validate the two-factor structure of the WIAQ obtained from the exploration. Confirmatory factor analysis and measurement consistency test are mainly used. The third part is to test the reliability and validity of the WIAQ.

First, SPSS 26.0 was used for descriptive statistical analysis, including mean scores, standard deviations, demographic variable distribution, and item analysis. Then, parallel analysis and exploratory factor analysis were performed using R Studio and the psych package.[58,59] JASP 16.0 was used to construct networks based on the EBICglasso algorithm, including network edge structure and network centrality analysis. By analyzing the network edge structure between items, researchers can understand which variables have close relationships and stronger correlations.[60] This helps better understand the inherent structural relationships between items and dimensions in the scale.[61] In the network centrality analysis, the following three indicators were mainly used to measure the relative importance of items: Betweenness centrality measures the importance of a node as an information dissemination bridge in the psychopathological network. Specifically, nodes with high betweenness centrality play a key role in the transmission of work information, as they are located on paths connecting other nodes; Degree centrality measures the connection strength of a node in the psychopathological network. Specifically, nodes with higher degree centrality have more direct connections in the network; Expected influence centrality is a centrality indicator calculated based on the connection relationship between a node and its neighboring nodes. In a psychopathological network, it measures the importance and influence of a node in the network, considering the connection strength of it and neighboring nodes and the centrality of neighboring nodes.

Secondly, confirmatory factor analysis of the data was performed using R Studio and the lavaan package to validate the single-factor and two-factor models of work information anxiety.[62] Confirmatory factor analysis was based on

maximum likelihood estimation (ML). The Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) with a 90% Confidence Interval (CI), and Standardized Root Mean Squared Residual (SRMR) were used to assess model fit. For these indices, models with CFI close to or greater than 0.900, TLI close to or greater than 0.900, and RMSEA close to or smaller than 0.080 indicate good model fit.[63] In addition, measurement invariance analysis of the WIAQ was performed using Mplus 8.0. Measurement invariance in factor analysis refers to the relationship between the observational variables and latent variables remaining unchanged across different groups or time points. The establishment of measurement invariance is an important prerequisite for meaningful group comparisons. Multiple group analysis was performed in a specific sequence, with each model compared to the baseline model, chi-square difference tested for the previous model, and fit index differences examined. Measurement invariance analysis of the WIAQ across gender, age, and education level was performed.

Finally, reliability and validity tests were performed on the data using Mplus 8.3. Reliability testing mainly included composition reliability and internal consistency, reporting Cronbach's alpha and McDonald's Omega coefficients. Reliability scores reaching 0.7 or above are considered good.[64] Validity testing mainly included convergent validity, discriminant validity, and criterion-related validity. These validity test indicators provide psychometric properties of the scale from different perspectives.

Results
Item Analysis
First, we conducted a preliminary analysis on the initially obtained items. Since the WIAQ may be applied in the future for subjective diagnosis in human resources, clinical settings, and psychiatry, all items need to have certain discrimination ability to effectively identify work information anxiety symptoms. To test item discrimination, the critical ratio (CR) method was adopted. The critical ratio is an index used in item analysis to test whether questionnaire items can distinguish between different response levels of respondents. If the CR value reaches a significant level ($p < 0.05$), it indicates that the item can distinguish between different response levels of respondents.

Specifically, we divided Sample 1 into high and low scoring groups according to the WIAQ total score, using the top 27% and bottom 27% as the dividing criteria, forming work information anxiety high (total score >37) and low (total score <23) scoring groups. t-tests were performed on items of the high and low scoring groups respectively, with 3000 rounds of bootstrap sampling analysis. Items with non-significant t-test results were deleted. The results show that, in the differentiation test between high and low scoring groups, all items reached significance, with significant differences ($t = 13.410 \sim 22.869$, $p < 0.001$) between the 10 items. This means that all 10 items can be retained for further factor analysis.

Exploratory Factor Analysis
Parallel analysis suggested 2 factors. As shown in Figure 1, the solid line represents real data, and the dotted line represents simulated data. Principal component analysis (PC), ie the x-line, has 1 component in real data higher than simulated data; similarly, factor analysis (FA), ie the triangle line, has 2 factors in real data higher than the mean eigenvalues of 100 simulated data matrices. Therefore, based on the combined results of the scree plot, we prefer selecting 2 factor components.

After obtaining the results of parallel analysis, we further conducted exploratory factor analysis (EFA). First, Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test were used to determine if the data was suitable for exploratory factor analysis. The results showed a KMO value of 0.907 (KMO > 0.7), and a Bartlett's sphericity test chi-square value of 1915.486, df = 45, $p < 0.001$, indicating that the Bartlett's sphericity test value reached significance, suggesting these items were suitable for factor analysis.

Secondly, in the exploratory factor analysis, oblique rotation with minimum residuals was used, based on the correlation matrix. The results showed that item5 had cross-loadings, so it was deleted. Finally, 9 items were retained. The results after re-running exploratory factor analysis are shown in Table 2. In factor analysis, Uniqueness can be used as an index to screen and eliminate unsuitable items. Higher Uniqueness values indicate higher uniqueness of the variable, meaning the variance of the variable cannot be explained by the common factors, and may be related to other factors or individual differences. Usually, when the Uniqueness value of a variable exceeds 0.7 or 0.8, it can be
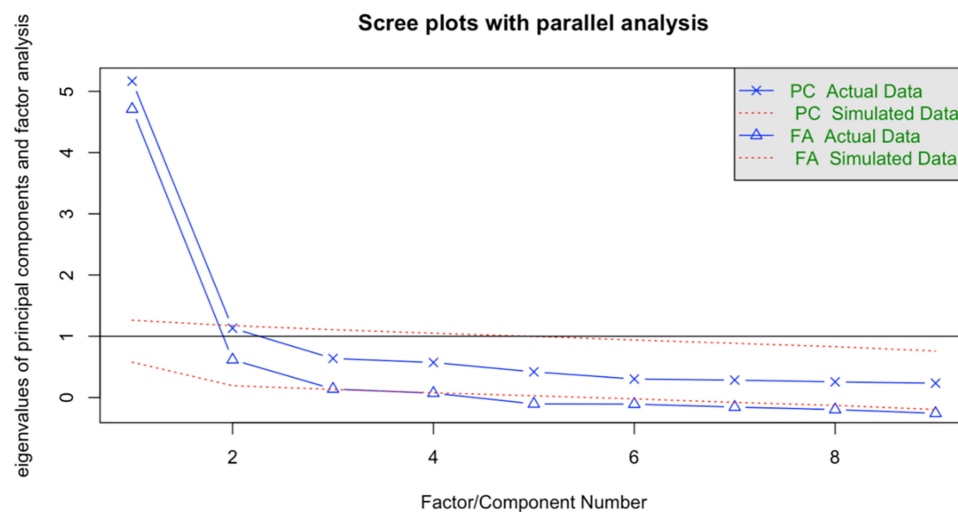
Figure 1 Parallel analysis scree plot.

considered as having high uniqueness and may need to be excluded. The retained 9 items all met the standard and did not need to be excluded. In addition, after extracting 2 factors, the cumulative variance explained reached 67.56%.

Network Analysis and Centrality

Although the exploratory factor analysis results have shown that the WIAQ exhibits a latent two-factor structure, the structure and composition of the WIAQ still needs to be further visually explored. In clinical psychiatry, network analysis as an emerging research method provides a new perspective to reveal the structure of the WIAQ and the structural relationships between items.[65] As shown in Figure 2, the network analysis included 9 items of the WIAQ as 9 nodes. The results of the network analysis showed that the overall item network exhibited a clear two-factor structure, including the yellow network (item7, 8, 11, 12, 13) and the green network (item14, 15, 16, 17). There were 26 connections in the network, indicating associations or mutual influences between these problems or aspects. This may mean that in work information anxiety, there is some correlation or common influencing factors between different problems or aspects. In addition, the network sparsity was 0.278, meaning that in work information anxiety, there are some independent characteristics or factors between different problems or aspects, not completely interdependent or influencing each

Table 2 Exploratory Factor Analysis Results

Original Item Number	Factor 1	Factor 2	Uniqueness
Item8	0.881		0.277
Item7	0.821		0.304
Item13	0.796		0.367
Item12	0.793		0.394
Item11	0.706		0.344
Item15		0.981	0.171
Item17		0.696	0.548
Item16		0.610	0.540
Item14		0.602	0.494

Notes: N = 324. Applied rotation method is cluster.
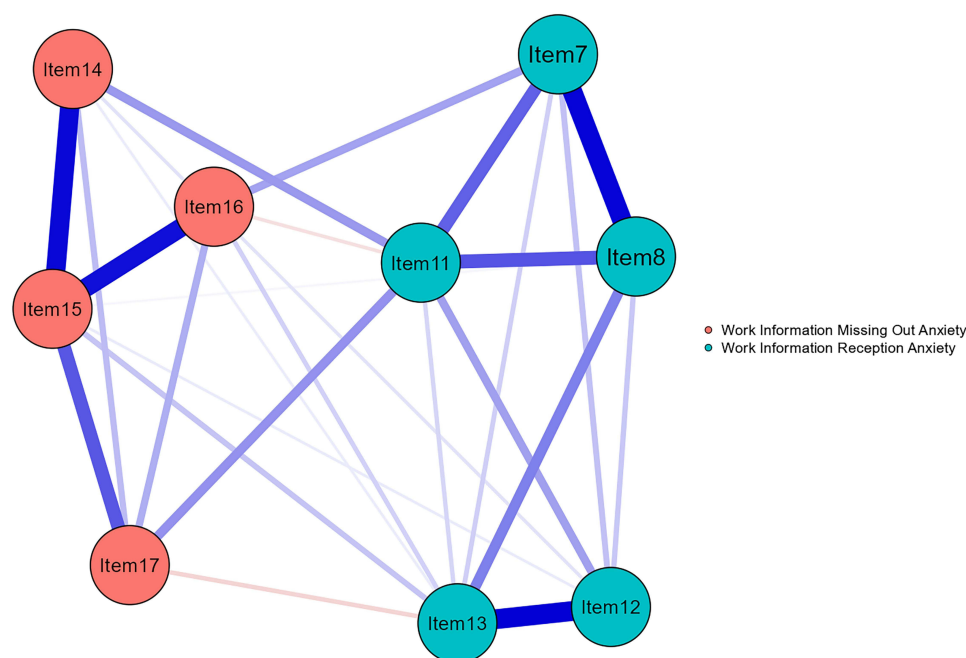
Figure 2 Network analysis plot.
Notes: Blue items represent Work Information Reception Anxiety, red items represent Work Information Missing Out Anxiety.

other. This is also reflected in items from the same factor being closer and more aggregated in Figure 2. In summary, the network analysis results further validated the exploratory factor analysis results, and displayed the two-factor structure in a more intuitive way, revealing the interrelationships between factors and even items.

Furthermore, the network analysis provided further insights into the core items in the WIAQ structure. As shown in Figure 3, the centrality analysis results of the network analysis indicated that item15 and item11 had markedly higher centrality compared to other items, and were consistent across different centrality metrics (betweenness, degree and expected influence). This means these two nodes play relatively important roles in the network, that is, they may reveal core symptoms in the work information anxiety network.

Finally, the results of both the exploratory factor analysis and network analysis revealed a two-factor structure of work information anxiety. This is consistent with the conceptualization based on the approach-avoidance theory. Accordingly, we named the two factors of the WIAQ. Item7, 8, 11, 12, 13 mainly focus on the fear, tension and disturbance people feel when receiving work information, hence named work information reception anxiety. Item14, 15, 16, 17 mainly focus on individuals' worry about missing important work tasks or information, feelings of guilt and anxiety, and persistent worry and unease, hence named work information missing out anxiety.

Confirmatory Factor Analysis

After the exploratory factor analysis, the Work Information Anxiety Questionnaire retained 9 items, including two dimensions of work information reception anxiety and work information missing out anxiety. As is shown in Table 3 and Figure 4, the overall model fit test results showed that the two-factor model fitted by exploratory factor analysis had better fit than the one-factor model. According to the parsimony principle, this indicates that the two-factor hypothesis of work information anxiety is completely necessary, supporting our theoretical hypothesis.

Measurement Invariance

To examine whether group differences may be caused by the measurement instrument itself, we conducted measurement invariance analysis. The equivalence of the WIAQ models across groups was examined according to gender, age, and education level. For gender, males and females were compared. For age, participants were divided into two groups based
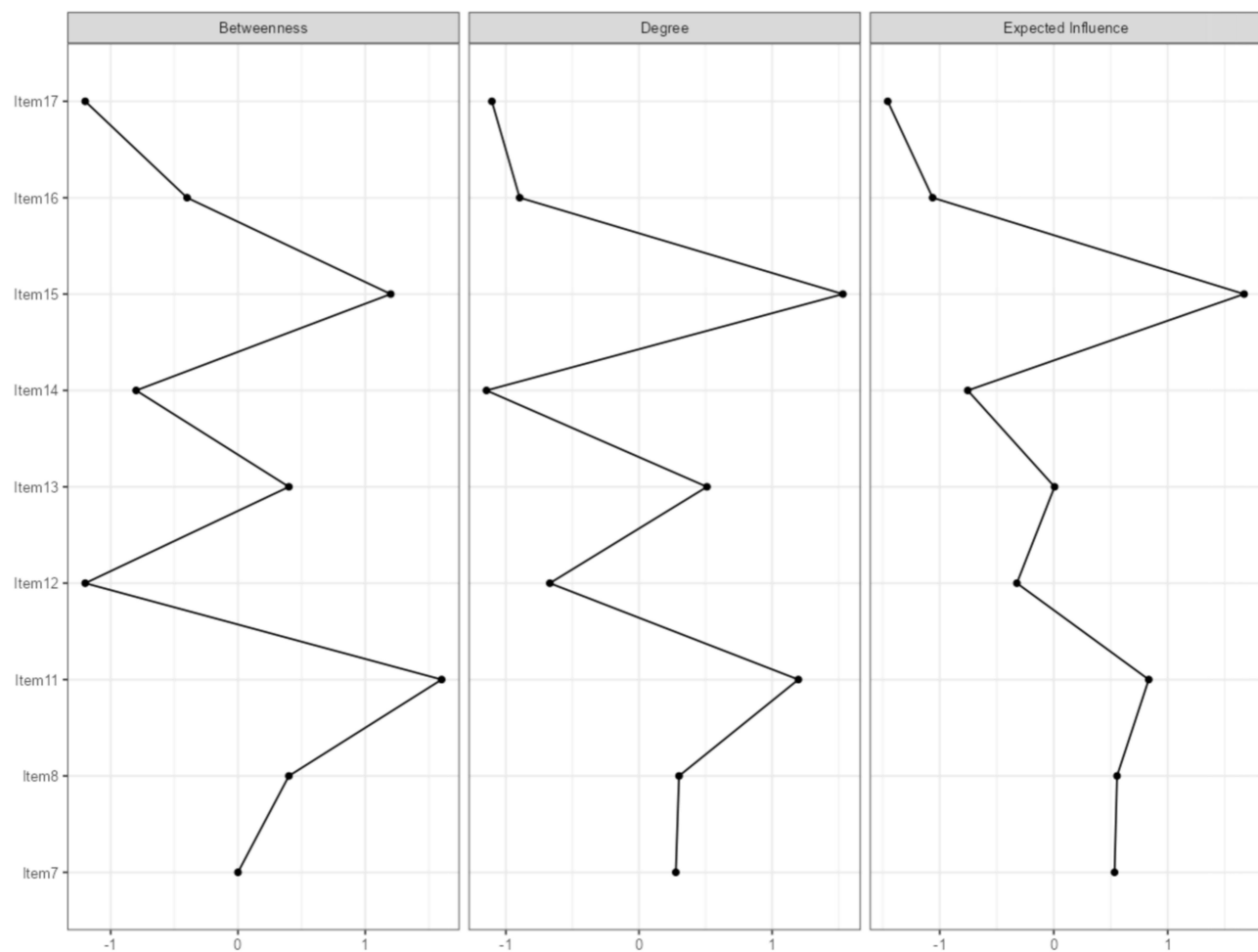
Figure 3 Centrality analysis results in network analysis.

on the mean age (25.11 years) for comparison. For education level, participants were divided into two groups of undergraduate degree or lower, and undergraduate degree or higher, for comparison.

We assessed and compared the configural (M0), metric (M1), and scalar (M2) models sequentially. First, the configural model demonstrated acceptable fit across groups. Indices for gender groups were as follows: $\chi^2(52) = 142.495$, CFI = 0.919, RMSEA = 0.029, 90% CI [0.104,0.154]. Indices for age groups were as follows: $\chi^2(52) = 124.912$, CFI = 0.934, RMSEA = 0.016, 90% CI [0.090,0.142]. Indices for education groups were as follows: $\chi^2(52) = $

Table 3 Fit Indices Results for Single-Factor and Two-Factor Confirmatory Factor Analyses

Fit Indices	Single-Factor	Two-Factor	Standard
Comparative Fit Index (CFI)	0.851	0.960	>0.90
Tucker-Lewis Index (TLI)	0.801	0.945	>0.90
Bentler-Bonett Non-normed Fit Index (NNFI)	0.801	0.945	>0.90
Bentler-Bonett Normed Fit Index (NFI)	0.831	0.938	>0.90
Root mean square error of approximation (RMSEA)	0.167	0.088	<0.10
Standardized root mean square residual (SRMR)	0.085	0.039	<0.05
Goodness of fit index (GFI)	0.806	0.979	>0.9
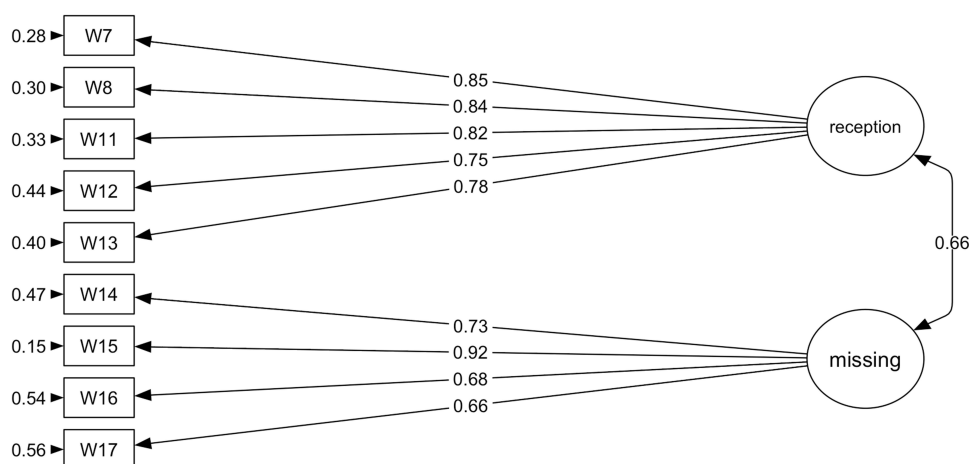
Figure 4 Confirmatory factor analysis and the result of the two-factor model.

151.680, CFI = 0.913, RMSEA = 0.035, 90% CI [0.110,0.160]. All fit indices indicated equivalent factor structures across groups and provided a baseline model for comparison with subsequent models. Next, we tested the metric model (M1) and scalar model (M2), as well as differences between the models. As shown in Table 4, the fit results indicated non-significant differences between the configural model (M0), metric model (M1), and scalar model (M2), with ΔCFI ≤ 0.010 and ΔRMSEA ≤ 0.015 across groups.[66] Therefore, we can conclude that the WIAQ demonstrated measurement invariance regarding its factor structure, factor loadings, and indicator intercepts across populations with different genders, ages, and education levels.

Composition Reliability and Internal Consistency

This study used the McDonald's ω of each dimension and the correlations between items and total score as indicators to assess the questionnaire's reliability. McDonald's ω is a reliability indicator based on factor analysis. It evaluates the internal consistency of the scale by calculating the correlation coefficients between each item and the total score.

Table 4 Test of Measurement Invariance Across Groups by Gender, Age, and Education Level

Model	χ^2	df	CFI	RMSEA [90% CI]	ΔCFI	ΔRMSEA
Gender						
M0 (configural)	142.495	52	0.919	0.029 [0.104,0.154]		
M1 (metric)	143.467	59	0.924	0.017 [0.093,0.141]	−0.005	0.012
M2 (scalar)	150.435	66	0.924	0.010 [0.087,0.134]	0.001	0.007
Age						
M0 (configural)	124.912	52	0.934	0.016 [0.090,0.142]		
M1 (metric)	133.132	59	0.933	0.009 [0.085,0.134]	0.001	0.007
M2 (scalar)	136.638	66	0.936	0.001 [0.077,0.125]	−0.003	0.008
Education						
M0 (configural)	151.680	52	0.913	0.035 [0.110,0.160]		
M1 (metric)	155.612	59	0.916	0.025 [0.101,0.149]	−0.003	0.010
M2 (scalar)	165.815	66	0.913	0.020 [0.097,0.143]	0.003	0.005

Compared to Cronbach's α, McDonald's ω is more stringent, as it considers the variance of factor loadings in the calculation, and thus may yield lower values in some cases.[67] The results showed that the McDonald's ω of the two factors were 0.906 and 0.831 respectively, meeting the standards in psychometrics (ω > 0.7).

Correlation analysis can be used to assess the internal consistency reliability of a scale. The Cronbach's α of the WIAQ was 0.899. In addition, if items of the scale have high correlations with the total score, meaning the items are intercorrelated and measure similar concepts, the scale can be considered as having good internal consistency reliability. The heat map shows the correlations between items and with the total score. As shown in Figure 5, the heat map results indicate that the scale has good internal consistency (r > 0.649).

Convergent Validity and Discriminant Validity

To examine the convergent validity of the WIAQ, we calculated the average variance extracted (AVE) values. AVE is an indicator that measures the variance explained by a factor. It represents the ratio of factor-explained variance to the total variance. Generally, an AVE root greater than 0.5 can be considered good convergent validity. Composite reliability (CR) indicates the consistency of variables explained by a factor. Higher CR values indicate higher consistency between variables explained by the factor and higher reliability of explanatory power. In general, a CR root greater than 0.7 can be
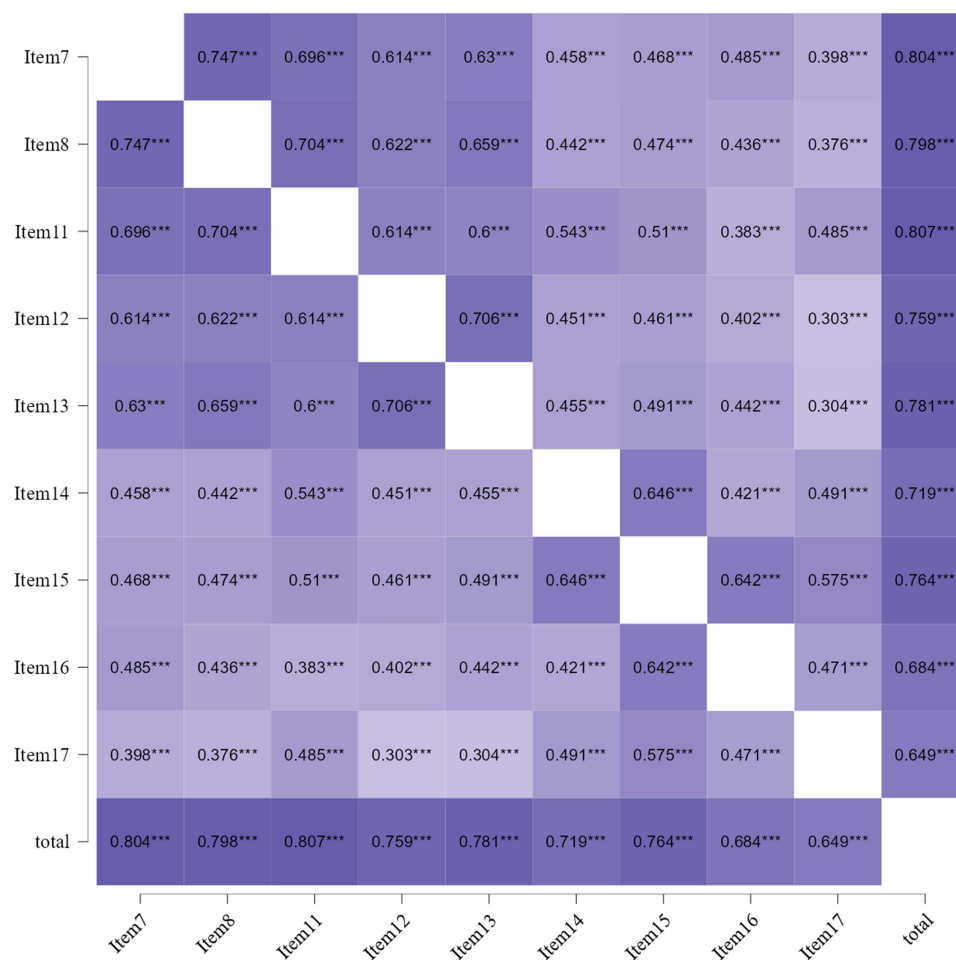
Figure 5 Heatmap of inter-item correlation analysis.
Notes: This heatmap is based on the results of correlation analysis, with different colored squares indicating the strength of correlation between different variables. Darker colors represent stronger correlations, while lighter colors represent weaker or non-existent correlations. ***Means *p* < 0.001, and all correlations are significant at the 0.001 level.

considered good convergent validity. The results show that, the WIAQ-reception CR = 0.822 and WIAQ-missing out CR = 0.903 were both greater than 0.7, indicating good convergent validity.

In addition, we further verified the discriminant validity of the scale by calculating the Pearson correlation coefficients between the two factors. The Pearson correlation coefficient measures the linear correlation between two factors. It is used to assess the discriminant validity between different factors, ie whether they represent different concepts. If the square root of a factor's average variance extracted (AVE) is greater than the Pearson correlation coefficients of other factors, it indicates relatively good discriminant validity. The results show that, the square roots of AVE for WIAQ-reception (0.733) and WIAQ-missing out (0.807) were both greater than their Pearson correlation coefficient (0.616), indicating relatively good discriminant validity.

Criterion-Related Validity

To examine concurrent validity, we selected anxiety measurement scales that have been widely used as criteria: the Self-Rating Anxiety Scale (SAS) developed by Zung and the Depression Anxiety and Stress Scale (DASS) developed by Lovibond & Lovibond.[54,57] These tools were also collected in Sample 2. Accordingly, we conducted correlation analysis between the WIAQ and SAS, DASS. The results show that, the total and factor (WIAQ-reception, WIAQ-Missing out) scores of the WIAQ in this study were significantly positively correlated with the SAS total score ($r = 0.900$, $p < 0.01$; $r = 0.812$, $p < 0.01$; $r = 0.785$, $p < 0.01$), and also significantly positively correlated with the DASS total score and its Depression and Anxiety factors ($r = 0.630$, $p < 0.01$; $r = 0.656$, $p < 0.01$; $r = 0.542$, $p < 0.01$). Therefore, it can be considered that the WIAQ has good criterion-related validity.

Discussion

With the advent of the information age, information as a direct or indirect stimulus largely affects our lives and even physical and mental health to a great extent. Work information anxiety in the workplace in particular directly affects employees' mental health and work efficiency. Next, we discuss the theoretical contributions and practical implications of this study:

Firstly, this study developed and validated the WIAQ scale for work information anxiety, and pointed out the two main causes of work information anxiety - work information reception anxiety and work information missing out anxiety. We obtained questionnaire items for the work information anxiety scale from existing literature and open-ended interviews, and examined the reliability and validity of the WIAQ through exploratory factor analysis, confirmatory factor analysis, and network analysis. This questionnaire can serve as an effective tool to measure work information anxiety in the future. The WIAQ scale is based on approach-avoidance conflict theory to describe the causes of work information anxiety. We believe there are two main sources of work information anxiety: On the one hand, when receiving information, employees experience psychological tension due to work information stimuli and tend to have avoidance motivation. As most information exchange in the workplace relies on communication devices, the increasing amount of information and real-time requirements for information processing lead to a sharp increase in employees' pressure to deal with work information.[19] Work information anxiety stems from the direct stimuli of work information. Psychologically, employees exhibit stress reactions such as tension, disturbance, and fear.[7] On the other hand, employees have approach motivations to understand work information. Missing important work information greatly causes individual anxiety. This indicates that not only the direct stimuli of work information, but also the anticipation of related information may be an important cognitive mechanism leading to anxiety. Missing out anxiety in the workplace mainly comes from interpersonal relationships and valuable information itself.[37] Individuals may develop generalized anxiety about missing important instructions from leaders, useful work information, social relationships and career development opportunities, and work benefits, and exhibit corresponding behavioral manifestations such as significantly increased work information checking behaviors.[37,47] In summary, compared with previous research tools, the WIAQ developed in this study has made necessary developments and innovations, providing valuable scientific evidence for the prevention and screening of information anxiety in the workplace.

Secondly, this study clearly proposed the concept of work information anxiety, which has not been explicitly proposed in previous research. This will have important implications for relevant research on work information anxiety. In the past, previous studies have mainly involved job-related anxiety, workplace-related anxiety, fear of missing out

(FoMO) in the workplace, etc.[5,13,37] The results of this study further develop previous research. The concept of work information anxiety is developed based on previous research on work anxiety. Work anxiety as a common stress response, excessive or insufficient work information can cause work pressure for employees, thus triggering anxiety. Individuals in a state of work anxiety often take two action strategies: First, deal with the source of anxiety directly by investing more resources to reduce the pressure, which leads to resource depletion. Second, take avoidance behaviors such as avoiding work and family responsibilities. Parker and DeCotiis proposed a work stress model from the perspective of organizational and work stress, suggesting that work stress has two different dimensions: time pressure and anxiety.[14] McCarthy and Goffin developed a workplace anxiety scale focusing on performance anxiety.[15] Jensen, Patel and Messersmith developed a work anxiety scale mainly measuring work anxiety from the perspective of individual emotional manifestations, such as tension, anxiety, panic, fear, etc.[17] However, existing tools do not fully depict the characteristics of work information anxiety, nor describe individuals' "uncomfortable reactions" to environmental stimuli. Workplace stimuli in the information age exhibit new features, requiring new tools to accurately measure the anxiety brought by "work information". Although these studies emphasized that "information" in the workplace may be one of the overlooked causes of employee anxiety, it has not been fully explored. In other words, previous studies focused on discussing employees' workplace anxiety and its effects, while this study focuses directly on work information anxiety itself, distinguishing it from generalized workplace anxiety in the past and highlighting the characteristics of the information age and workplace. In addition, previous studies lacked discussion on the structure of work information anxiety. This study constructed dimensions and items based on approach-avoidance theory, clarifying the two main dimensions of work information anxiety - work information reception anxiety and missing out anxiety - providing a possible perspective to further explain the theoretical mechanisms of work information anxiety.

Finally, this study contributes to relevant research on approach-avoidance conflict theory by expanding its application scenarios. The theory has been mainly applied to clinical anxiety and is considered an important mechanism for explaining the occurrence of clinical anxiety.[25,26] The approach-avoidance conflict theory has rarely been used to explain sources of anxiety in daily life. In this study, we applied the theory to the workplace to construct and explain the dimensions and framework of work information anxiety. The obtained two-factor dimensional structure of work information anxiety is unprecedented. We not only verified the rationality of this theoretical structure, but also emphasized its adaptability to understanding work information anxiety. In addition, we explained the interconnections between the two motivations in the approach-avoidance conflict theory by applying the psychopathological network theory.[68] On the one hand, the internal structure and relationships between symptoms of work information anxiety are further understood through network analysis. The advantage of network analysis is that by constructing networks between symptoms, it reveals the interactions and relative importance between different symptoms. It helped us reveal the correlations and aggregation between items in the work information anxiety questionnaire. The network graph formed by repulsion enabled us to more clearly understand which nodes have closer relationships.[69] It allowed us to more comprehensively grasp the complexity and multidimensionality of work information anxiety. By combining theory and practice, we can understand the mechanisms and nature of work information anxiety more fully. On the other hand, network analysis helped us identify key items and core concepts in the work information anxiety questionnaire. By analyzing the node centrality indices of items, we identified symptoms that have significant impacts on work information anxiety, which can be used to simplify the scale or provide guidance for intervention measures.[70] Therefore, the discussion of work information anxiety in this study has undoubtedly advanced the existing approach-avoidance conflict theory.

Limitations and Future Research

However, there are still some limitations in this study. First, a convenience sampling method was used to collect the samples, which has a certain cost-effectiveness ratio and will maintain good ecological validity. At the same time, we acknowledge the potential limitations of this sampling method in sample diversity, sample size, and gender distribution. Therefore, when generalizing the findings of this study to other populations or industries, the issue of applicability needs to be paid special attention. Although the measurement invariance analysis in this study indicates that the WIAQ has cross-group consistency in terms of gender, age, and education level, gender bias is still an important limitation. In future research, we will use completely random sampling or stratified sampling to overcome the limitation of gender bias.

Secondly, cultural factors were not considered in the development of work information anxiety items. This study collected data from employees of companies in China via online questionnaires. Therefore, the applicability and effectiveness of the WIAQ for employees of companies in other countries remains to be further explored. Work information anxiety is a global phenomenon, strengthened in the information age, requiring cross-cultural surveys to verify the stability of the work information anxiety questionnaire. Thirdly, although corporate employees were surveyed in this study, it did not consider whether work information anxiety has different characteristics among new and senior employees. In the future, verification and comparison of employee groups with different working years and positions will be strengthened. Finally, this study adopted the approach-avoidance conflict theory for theoretical construction, but did not examine how the two different motivations interact to jointly cause employees' psychological conflicts and anxiety. In the future, the interaction effect mechanism of approach-avoidance motivations will be further discussed.

Conclusion
The Work Information Anxiety Questionnaire developed in this study includes two dimensions of reception anxiety and missing out anxiety, with a total of 9 items. Through exploratory factor analysis, confirmatory factor analysis, network analysis, and reliability and validity testing, the WAIQ demonstrated good psychometric properties and can serve as an effective tool to measure work information anxiety.

Data Sharing Statement
The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Approval and Informed Consent
Our study has been performed in accordance with the Declaration of Helsinki. Prior to the start of our study, all participants were required to read the purpose of our study and were informed that their personal information would be coded to ensure anonymity. Informed consent was retrieved by all participants, and our study were approved by the Human Ethics Office of College of Education, Wenzhou University (Protocol code: HE2020-0120) (Date of approval: 20 January 2020).

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