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Use of Experience Sampling Method in the Assessment of Anxiety Disorders: A Systematic Review

Deneyim Örnekleme Yönteminin Anksiyete Bozukluklarının Değerlendirilmesinde Kullanımı: Sistematik Derleme

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Abstract

Experience Sampling Method (ESM), which makes possible to make momentary assessment during daily life by using portable devices and applications, has been actively used in clinical psychology research along with accelerating technological developments in recent years. The use of this method might be highly functional in some problems characterized with fluctuating symptom severity such as anxiety disorders. Because it is aimed to investigate the current literature findings about the use of this method in research on anxiety disorders and to make inferences about main study findings in this systematic review, current empirical studies particularly on anxiety disorder symptoms performed with the ESM were screened and examined. Taking the recent DSM-5 revisions into account, specific keywords were determined and scanned in 4 different databases (Web of Science, ProQuest, PsycINFO and PubMed). Following the screening processes, 14 articles that matched with inclusion criteria were involved in the present study. Firstly, it is seen that those studies were performed by using ESM generally included the adults and female participants and assessments with experience sampling measurements by electronic devices took 9 days in average. Moreover, it is also observed that among the different categories of psychological disorders, were evaluations on momentary affect changes, post-event processing and rumination that were usually studied. In sum, it is considered that ESM is a functional method that can be used in the field of scientific research, and it may be beneficial that recognizing and extending the utilization of this method.

Keywords: Experience sampling, ecological momentary assessment, anxiety disorders

Öz

Günlük yaşam esnasında taşınabilir cihaz veya akıllı telefon uygulamalarıyla anlık ölçümler almayı mümkün kılan Deneyim Örnekleme Yöntemi (Experience Sampling Method, DÖY), son yıllarda hızlanan teknolojik gelişmeler ile beraber klinik psikoloji araştırmalarında aktif şekilde kullanılmaya başlanmıştır. Özellikle anksiyete bozuklukları gibi belirti şiddetinde dalgalanmalar gözlenen bozukluklarda bu yöntemin etkin kullanımının oldukça işlevsel olduğu söylenebilir. Bu sistematik derlemede, DÖY'ün anksiyete bozukluklarında kullanış biçimlerini gözden geçirmek ve genel bulgulara ilişkin çıkarımlar yapmak hedeflendiği için alanyazında özellikle anksiyete bozukluklarına ait belirtileri DÖY ile değerlendiren güncel görgül çalışmalar sistematik olarak taranıp incelenmiştir. Araştırma kapsamında, DSM-5'te yapılan son değişiklikler göz önünde bulundurularak belirlenen anahtar kelimeler 4 farklı veri tabanında (Web of Science, ProQuest, PsycINFO ve PubMed) taranmış; tarama işleminin ardından belirlenen ölçütlere uygun olan 14 makale bu derlemeye dâhil edilmiştir. İlk olarak DÖY kullanılarak yapılan bu çalışmalarda, çoğunlukla yetişkin ve kadın örneklem grubu ile çalışıldığı ve deneyim örnekleme ölçümlerinin ortalama 9 gün boyunca elektronik cihazlar ile yapıldığı görülmektedir. Ayrıca farklı bozukluk kategorilerine yönelik bu görgül çalışmalarda ortak olarak çoğunlukla anlık duygulanım değişimleri, olay sonrası işlemleme ve ruminasyon gibi ilişkili faktörlerin çalışıldığı görülmüştür. Özetle, DÖY'ün bilimsel araştırma alanında kullanılabilecek işlevsel bir yöntem olduğu ve bu açıdan yaygınlaşmasının faydalı olabileceği düşünülmektedir.

Anahtar sözcükler: Deneyim örnekleme, anlık değerlendirme, anksiyete bozuklukları

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STANDARDIZED measurement tools which are frequently used in psychological assessment are mostly based on self-report instruments with retrospective focus. However, assessment of the fluctuating symptom severity over time and the differences due to the situational conditions via retrospective inquiries may not reveal fully reliable consequences. It is also asserted that as the time between experiences and measurements increases, a number of memory biases can be introduced and therefore, the evaluation process may be adversely affected. In this sense, the retrospective evaluation is influenced by subjective interpretations and the mood state of the person (Miron-Shatz et al. 2009). On the other hand, the Experience Sampling Method (ESM), has been used in the field since the 1980s, as an alternative method to retrospective memory biases by exemplifying one's instant experiences (Csikszentmihalyi and Larson 1987). In the literature, ESM has been mentioned with different names such as Ecological Momentary Assessment or Ambulatory Assessment and, there are its similar versions already applied in medical sector for evaluations. This method can be preferred for its practical features to taking measurement at the time of the event or at the most possible sooner time (Santangelo et al. 2013). Thus, it is emphasized that various biases stemmed from psychological assessment tools can be reduced, and detailed evaluations about dynamic processes such as thought, emotion and behavior can be made (Larson and Csikszentmihalyi 2014). In addition, it has been reported that besides the ease of clinical assessment, ESM also provides answers to specific research questions at the time of the event (Bolger et al. 2003). With this method, repeated measurements can be taken on a subject at the time of the event or during certain periods, whereby individual differences can be determined in more detail.

The application of the ESM can be done at a specified time (eg. at the end of the day) in some cases, depending on the measurement purpose; and in other cases, it is performed with signals sent in random times. Alternatively, a measurement can be taken at the time a specific event occurs if it meets the characteristics of the measured variable (Santangelo et al. 2013). In the first years of the application of ESM, more paper-pencil diaries were used. As technological developments proceeds, e-diaries, handheld computers (personal digital assistants), software that can be installed on smartphones and devices that make physiological measurements have been used (Santangelo et al. 2013). Regarding the literature, it can be seen that ESM has been used in studies involving different psychopathologies such as borderline personality disorder (Stiglmayr et al. 2008), mood disorders (Aan het Rot et al. 2012), developmental disorders (Tryon et al. 2006), trauma and related disorders (Solzbacher et al. 2007), eating disorders (Vansteelandt et al. 2004) and obsessive compulsive and related disorders (Purdon et al. 2007).

Anxiety disorders are common problems in the clinical population. Lifetime incidence of these disorders is reported in a range ranging from 14.5% to 33.7% (Bourdon et al. 1992, Wittchen and Jacobi 2005, Alonso and Lepine 2007, Kessler et al. 2012). The most common subtypes in anxiety disorders are specific phobias (13.8%) then social anxiety disorder (13%; SAB), generalized anxiety disorder (6.2%; GAD), panic disorder (5.2%; PB) and agoraphobia (2.6%) respectively (Alonso and Lepine 2007). Lifetime prevelance of separation anxiety disorder, which is newly included among anxiety disorders, reported to be 7.7% for adolescents and 6.6% for adults (Kessler et al. 2012). These disorders generally have a mean age of onset 11; among these, the earliest beginning disorders were specific phobia and separation anxiety disorder (7 years); SAB (13 years),

agoraphobia (20 years), PB (24 years) and GAD (31 years) are reported to follow these respectively (Kessler et al. 2005). Distribution of anxiety disorders according to gender is reported to be between 1.5 and 1.8 times higher in females than males (Alonso et al. 2007, Kessler et al. 2012). In addition, it is reported that the effects of anxiety disorders in daily life prevent people from continuing their lives efficiently (Andlin-Sobocki and Wittchen 2005).

A number of clinical interview forms and retrospective self-report measurements have been developed in the assessment of these disorders, which are very common in the clinical picture (Knappe and Hoyer 2014). Although these self-report measures, which are reported to be valid and reliable, are frequently used by researchers and practitioners, they do not fully meet the need for immediate assessment of symptoms and carry risks of memory biases. In this way, the use of ESM in scientific research has become widespread in recent years and has been used as an alternative and beneficial way by researchers (eg Walz et al. 2014).

The first known ESM study in the field of anxiety disorders was conducted by Margraf et al. in 1987. In this study, the fear of death in the participants with panic disorder (PD) was compared with the momentary assessments and retrospective measurements. In this study, it was showed that ambulatory assessments reached a remarkable result. For example, the level of fear of death as determined by ESM was 3%, whereas this symptom was reported at 70% in retrospective evaluations. This study, which was conducted in a very early period, was followed by researches in different fields and the differences reached in general as a result of the evaluation were supported. In addition, ESM was also used to measure the fluctuating anxiety symptoms and symptoms that could be seen depending on the environment or condition (e.g., panic attacks and SAD symptoms in the social situation) (Helbig-Lang et al. 2012). Therefore, in this study, it is aimed to review the studies used ESM in assessment of anxiety disorders, and to examine the application and the tools used in this field. It is also aimed to make inferences about the factors associated with anxiety disorders over the study findings. For this reason, in this study, systematic review findings of the using ESM in assessment of anxiety disorders will be given. One of the main criteria in this systematic review is the elaboration of recent empirical studies after 2013, when the most recent systematic review of the use of ESM in anxiety disorders in the relevant literature (Walz et al. 2014) was published.

Moreover, it is known that obsessive compulsive disorder (OCD) and posttraumatic stress disorder (PTSD) are removed from anxiety disorders category in last version of Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatry Association 2013) and these disorders are considered as a separate section, while selective dysphagia and separation anxiety disorder are included in anxiety disorders. Considering these changes, articles in this review included only studies on anxiety disorders defined in DSM-5; thus, several studies with OCD and PTSD diagnosis were excluded. It is also important to note that some intervention studies are also excluded to make the purpose more specific and to reveal the functionality of this method only from the point of psychological assessment. In the light of this condition, it is thought that this review can be used to highlight the importance of this method by clarifying how the ESM is reflected in the evaluation processes on the basis of anxiety disorders. Furthermore, the truth of there is any other study conducted on our country about this topic make this review's importance more clear. Firstly, methodological processes will be mentioned in

the article flow, then the results of the research will be summarized over the disorders and finally, a general discussion will be presented.

Method

Screening and selection process

The articles used ESM in the assessment of anxiety disorders scanned by using the internet in ProQuest, Web of Science, PubMed and PsycINFO databases with ("experience sampling" OR "ecological momentary" OR "ambulatory assessment") AND ("anxiety disorder*" OR "phobia" OR "panic") key terms. In the process of filtering the publications, the date range was selected as the years 2013-2018 in accordance with the rationale of the study, and only the studies written with English language were scanned.

A total of 175 articles were found from 4 databases after scanning (Web of Science: 117 results, PsycINFO: 11 results, ProQuest: 13 results, and PubMed: 34 results). In addition, the reasons for exclusion of articles according to the excluding criteria consist of; to be a review article (n = 8), the primary diagnosis was different from anxiety disorder (n = 28), non-adult sampling (n = 8), mentioning ESM but not used as a tool in study (n = 7), ESM used in intervention (n = 6), undiagnosed sampling (n = 5) and case study (n = 1). As a result of this elimination process, six of the 14 articles that are considered suitable for inclusion in this review were diagnosed as having GAD, the other six were diagnosed with SAD, and the remaining two were diagnosed with PD. In Figure 2.1, the process is summarized visually with the flow diagram prepared according to the PRISMA criteria (Preferred Reporting Items for Systematic Reviews and Meta-Analyzes; Moher et al. 2015).

Results

General features of studies

When the sample characteristics of the 14 studies included in this review are examined, it is seen that the number of participants varies between 39 and 284. In terms of gender distribution, it is seen that women are more than men in all studies, and even in one research all of the samples are composed of women (Thompson et al. 2016). Looking at the geographical regions where the research is conducted, it is seen that the majority were conducted in America (n = 10), and then Switzerland (n = 2) and last Germany (n = 2).

The mean age of the research samples ranged from 28.3 to 39.6 years. In addition, in some studies, it was seen that the sample consisted only of participants who were mostly diagnosed with GAD, SAD or PD (n = 8), while others had comorbidity with mood disorders and / or other anxiety disorders (n = 6). Most of the studies included control group in their sample (n = 10) while other studies including only a single group of disorders (n = 4).

When we look at the researches in general, the emotion regulation, post-event rumination, metacognition, decentering, ability to differentiate negative emotions, post-event processing, and adherence to life goals appears to be related with symptom levels and continuity of different types of anxiety disorders. In general, the reasons for using the ESM are reported as to decrease the memory bias caused by retrospective measurements,

to be able to make instant measurements and to understand the affect status immediately after the event. The ambulatory assessments included in the surveys were carried out via online surveys and applications downloaded to the participants' own smart phones. However in a study, electronic devices (Palm Pilot Z22, ESP 4.0 software; Barrett and Barrett 2000), which instructed to the participants to carry with them, were used. In many other studies, it is seen that combined assessment times are used.

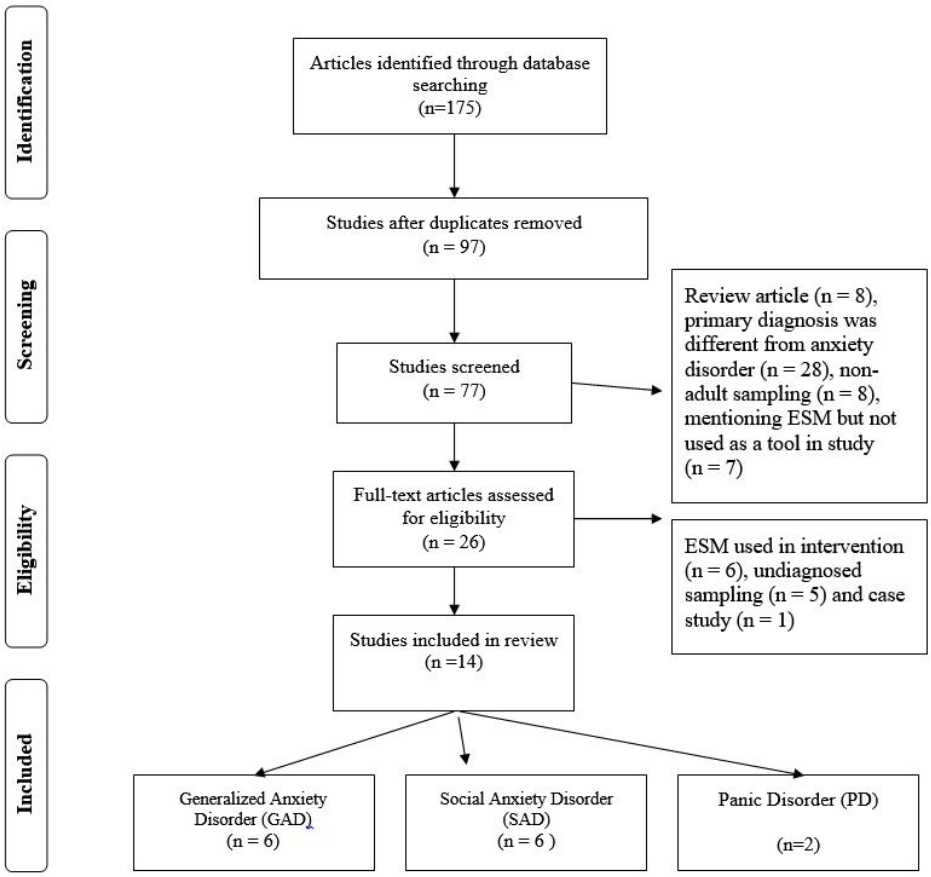

Figure 1. PRISMA flow diagram
ESM= Experience Sampling Method

Findings of the studies

As demonstrated in Table 1, 14 articles included in the review were divided according to different subtypes of anxiety disorders (GAD, N = 6; SAD, N = 6; PD, N = 2; see Figure 1 for distribution). According to the comparison groups used in the researches, it is seen that, control groups consisting of individuals with major depression (MD) in some studies while in the others with healthy adults. Measurement formats consist of electronic devices, online survey, smartphone application, and phone messages. The number of daily measurements varies from one to eight and the total measurement time is from six

days to two weeks. The total number of measurements is at least 14 and maximum 84 (see Table 1 for detailed illustration).

In the first of the six experience sampling studies conducted with the GAD patients group (Thompson et al. 2016), the difference between the current affect and "the should affect" was assessed by the ambulatory measurements performed eight times a day for a week. According to the results of this study, as compared to the control group, three patient groups (MD, GAD, MD and GAD comorbidity) reported that they felt less positive emotions even though they should feel more; and felt more negative emotions even though they should feel less. In another study (Kircanski et al. 2017), patients who were diagnosed with GAD and MD were compared with the control group in terms of instant affect and rumination. According to the results, it was observed that after an important event, the patients in the clinical group reported that their ruminations increased but the level of anxiety did not change. In addition, in the clinical group, the increase in rumination in a measurement decreased the positive affect and increased negative affect in the next measurement. In the control group, it was stated that the anxiety decreased the negative affect in the next measurement, so it was functional.

The same group of researchers tested the theoretical background of rumination and anxiety with a similar sample (Kircanski et al. 2015) and rumination was associated with unwanted, repetitive, uncontrollable thoughts; the content of thought was found to be focused on the past and the person himself. Similarly, worry was explained by the unwanted and repetitive thought forms, but the content of the thought was found to be more future-oriented and verbally linguistic. In addition, it is stated that anxiety is strongly related to the feelings of uncertainty on situations. In another study that supported the findings related to rumination (Ruscio et al. 2015), momentary affects, the stressful event since the last signal and the experienced symptoms of the adults diagnosed with MD and GAD were graded after eight randomly received signals during the day. According to the results of the study, MD and GAD comorbid groups were the most stressful group, followed by MD group and GAD group, respectively; the least stressed event was reported by the control group. The results were similar in terms of ruminative response to stressful events. As rumination increases, both depression and anxiety symptoms increase, concurrently avoidance and safety behaviors also increase.

In another study (Thielsch et al. 2015), the effect of negative metacognitions and sleep quality on GAD was investigated. Sleep quality measurement was obtained when the patients woke up in the morning as event based. Anxiety measurement was done twice a day as time based, and before bedtime as event based. According to the results of the study, the negative metacognitions that a person's anxiety is uncontrollable increases the time spent with worrying. In addition, low sleep quality at night is associated with an increase in the amount of anxiety in the following day. At the same time, the excess of worries measured before bedtime is associated with a low level of sleep quality.

In the last study conducted with individuals with GAD, the existence of the concept of decentering in the daily lives of GAD, SAD, PD and MD patients was examined in terms of 2 factors (observer perspective and low struggle with internal experiences) (Naragon-Gainey and DeMarree 2017). According to the results of the study, the increase in the negative affect and the decrease in the positive affect associated with higher levels of anxiety and the symptoms, as long as the struggle of the person with his symptoms increases and he cannot look at his experiences from observers' perspective.

Table 1. General features of the studies

Reference	# Participants	Patient Group		Comparison Group		Measurement Method				
	N	N	Description	N	Description	Format	Measurement Time Choice	Measurement Number per Day	Total Measurement Time	Total Measurement Number
Generalized Anxiety Disorder (GAD)										
Thompson et al. (2016)	70	15	GAD	16 20 19	MD MD & GAD Control	Electronic Device	Stimulus	8	1 week	56
Naragon-Gainey and DeMarree (2017)*	135	50% 44% 20% 48%	GAD SAD PD MD	-	-	Text Message + Online Survey	Stimulus (Random) Time Event	3	10 days	30
Ruscio et al. (2015)	145	36	GAD	38 38 33	MD MD & GAD Control	Electronic Device	Stimulus (Random)	8x2	7 days	56
Kircanski et al. (2015)	70	15 16 20 19	GAD MD GAD & MD Control	-	-	Electronic Device	Stimulus (Random)	8	7 days	56
Kircanski et al. (2017)	70	15 16 20	GAD MD GAD & MD	19	Control	Electronic Device	Stimulus (Random)	8	7 days	56
Thielsch et al. (2015)	56	56	GAD	-	-	Electronic Device	Time Event	4	1 week	28
Social Anxiety Disorder (SAD)										
Kashdan and Farmer (2014)	85	43	SAD	42	Control	Electronic Device	Stimulus (Random) Time Event	4-6	2 week	56-84
Gloster et al. (2017)	284	118 47	MD SAD	11 9	Control	Smart phone Application	Time	6	6 days	36
Lang et al. (2016)	59	59	SAD	-	-	Electronic Device	Stimulus (Random) Time Event	4	1 week	28
Farmer and Kashdan	79	40	SAD	39	Control	Online Survey	Time	1	2 week	14

(2015)										
Kashdan and McKnight (2013)	76	38	SAD	38	Control	Online Survey	Time	1	2 week	14
Kashdan et al. (2013)	76	38	SAD	38	Control	Electronic Device	Event	?	2 week	?
Blalock et al. (2015)	79	40	SAD	39	Control	Online Survey	Time	1	2 week	14
Panic Disorder (PD)										
Pfalzt et al. (2015)	39	20	PD	19	Control	Electronic Device	Time	5	1 week	35
Naragon-Gainey and DeMarree (2017)*	135	50% 44% 20% 48%	GAD SAD PD MD	-	-	Text Message + Online Survey	Stimulus (Random) Time Event	3	10 days	30

MD = Major Depression, GAD= Generalized Anxiety Disorder, PD= Panic Disorder, SAD= Social Anxiety Disorder; * In the article itself, the distribution of the number of participants according to the disorder clusters is indicated only as a percentage.

Considering 7 studies that ESM is used for assessment of SAD, emotional variables which are influential in social anxiety level, anxiety level after social interaction, and post event processing were evaluated. Farmer and Kashdan (2015) have compared affect and self-confidence levels after social interaction in patient with SAD and healthy control group. Data were collected every end of day reveals that patient with SAD experience more negative emotions, have low levels of self-confidence, and more stress sensitivity. Similarly, Kashdan and his colleagues (2013) have examined emotional and social factors effect SAD symptoms that emerge linked social interactions. Study results that collected with ESM method after social interactions reveal patients with SAD experience less positive emotions and use experiential avoidance as an emotion regulation strategy. In another study which evaluates emotion regulation in SAD, patients with SAD and healthy controls were compared by one time per day momentary assessment with regard to emotion regulation strategy and mood (Blalock et al. 2016). According to the results patients with SAD display more emotion suppression, but less cognitive reevaluation strategy, and SAD diagnosis is a factor which mediates emotion regulation and emotional experience. Another study result, in which the ability of distinguish negative emotions is evaluated by the measurements taken after time-dependent and social interactions, revealed that SAD patients' ability of distinguishing negative emotions are less than healthy controls (Kashdan and Farmer 2014). Helbig-Lang and his colleagues (2016) have also evaluated post-event processing in SAD patients by electronic diaries in three times per day. Results showed that there is no significant difference between reported events, social anxiety and avoidance, variables such as personality affects post-event processing, performance required events create more post-event processing, and also increased self-focused attention, safety seeking behaviors, and negative emotions trigger post-event processing. Gloster and his colleagues (2017) have examined symptom fluctuation

and memory gap by evaluating certain symptoms of depression and anxiety disorder, and physiological measures such as sleep with ESM method. According to the findings, the symptoms of a person appear to be quite stable when measured over long periods of time, but vary considerably when evaluated within one day or one week. In another study related to SAD, 'purpose in life' concept of acceptance and commitment therapy approaches, which has been frequently mentioned in recent years has been examined (Kashdan and McKnight 2013). The findings of the online survey show that individuals with SAD have less scores in daily effort and development level, self-confidence, meaning in life and positive/negative affect measurements compared to healthy controls (Kashdan and McKnight 2013). According to these studies, it is possible to say that momentary assessment present detailed data about the emergence of anxiety symptoms and course of the disorder. In addition, the fact that end-of-day measurement differences are less between individuals with SAD and control group may be considered as a finding that emphasizes the importance of momentary assessment.

In literature, it is seen that the number of studies evaluating panic symptoms by means of momentary assessment less than other anxiety disorders. One of these studies, psychophysiological functionality was evaluated by using electronic diary in PD patients. Findings indicate that co-existence of physical activity and heart rate in PD increases anxiety sensitivity and affects the level of anxiety experienced (Pfaltz et al. 2015). In another study evaluating the factors related to metacognitive awareness in panic symptoms, it was found that the negative affect was higher in individuals who struggled more with internal experiences about panic symptoms and predicted the symptoms of this dual interaction (Naragon-Gainey and DeMarree 2017). When these studies are evaluated together, it can be said that momentary assessments provide detailed data on the physiological symptoms observed in PD, as well as facilitating the measurement of psychological symptoms that occur during or after physiological symptoms.

Considering all these studies, it seems that momentary assessments provide more consistent and reliable information than retrospective measurements. On the other hand, since the hypotheses of these studies were mainly based on the psychological processes in daily life, it can be considered that the ESM is naturally preferred instead of retrospective measurements. For instance, it has been reported that retrospective self-report tools are inadequate in measuring psychological responses such as rumination, instant affect, which may occur after daily life events (Thompson et al. 2016, Kircanski et al. 2017). Similarly, the hypothesis suggested in some cases, as might be seen in the study examining the relationship between sleep quality and exaggerated anxiety symptoms during the day, also necessitates the use of ESM (Thielsch et al. 2015). On the other hand, the use of ESM in evaluation processes may be a facilitating factor for the development of more effective psychological interventions (Kashdan and Mcknight 2013). In all the studies included in the review, it is seen that the measurements of ESM are performed in daily or 3 to 8 hour intervals. The increase in the measurement frequency, also limits the latency of the retrospective memory (Gloster et al. 2017).

Discussion

In this systematic review, 14 empirical studies were reviewed in which ESM was used as an evaluation method in anxiety disorders according to DSM-5 criteria and in accordance with the criteria determined in this study. In the studies included in the review, it is

generally seen that variables such as affect, emotion regulation and ability to differentiate emotions, metacognitive factors, rumination, post-event processing, presence of purpose in life are examined, and in this context, current explanations of anxiety disorders are presented. In these studies, these variables were measured at random times, specific times or immediately after when symptoms are triggered. In this review, topics such as the use and functionality of the ESM in anxiety disorders are discussed.

First of all, in the five-year period, there are 14 empirical studies in which anxiety disorders were evaluated by the ESM; thus, it can be considered that ESM is a remarkable and promising assessment method in the clinical psychology literature. When we look at characteristics of these studies in detail and the sample characteristics of these studies are examined first, it is observed that the participants are mostly young adults and adults. In the literature, anxiety disorders are reported to begin mostly in adolescence and young adulthood (Kessler et al. 2005). This finding may indicate that, although the age of onset in anxiety disorders is early, treatment seeking emerged in later ages. In addition, it is observed that the number of women is higher than that of men in terms of gender distribution. Epidemiological data on anxiety disorders suggest that this set of disorders is more common in women (Alonso et al. 2007, Kessler et al. 2012). Therefore, it is supposed that the research sample is predominantly composed of women. In addition, in some studies, it is seen that the research hypothesis is based only on women in line with epidemiological data, and therefore studies are carried out only by female sample, regardless of sampling accessibility factor (e.g., Thompson et al. 2016).

Another characteristic of the samples is that some participants have comorbid disorders. In the review, GAD, SAD and PD were identified as the main diagnostic areas and the studies were evaluated on this axis; however, it is seen that the individuals included in the studies received different comorbid disorders. For example, MD is the most common comorbidity; moreover, other anxiety disorders may accompany the primary diagnosis. In the studies, it is viewed that factors such as psychotic disorder, substance use disorder, suicidal tendency are excluded and the samples are formed accordingly. MD is a disorder with a high rate of comorbid anxiety disorders (eg. Kendler et al. 2007). For this reason, it is not seen as an exclusion criteria in the research. Instead, the presence of more severe anxiety disorder or primary diagnosis are determined as an inclusion criteria.

This review shows that the momentary assessments used in the researches have different characteristics. In these studies, it is observed that different approaches are adopted such as taking the momentary assessment randomly, taking it at certain times, following a specific situation/event or using these methods together. Which method is preferred can be determined according to the characteristics of the anxiety symptoms examined within the research. For example, measurement is taken especially after social interaction situations in SAD, while it is taken at random times in GAD and PD. More specifically, some variables associated with anxiety disorders (eg. acute anxiety symptoms) should be measured at the time of the event, while others (eg. post-event processing, rumination) can be measured more quickly after the event. Therefore, it should be decided by taking into consideration which type of measurement will be used, the variables to be measured and the nature of the problem.

One of the obvious features of ESM measurements in these studies is that there are no significant differences between individuals with SAD and healthy individuals when social interaction measurements are taken at the end of day; but there is a significant

difference in the post-event measurements (Kashdan and Farmer 2014). Similarly, Gloster and his colleagues (2017) evaluated the symptoms of depression and anxiety disorder and found that the symptoms are more stable in retrospective measurements, while symptom fluctuation are observed in ESM measurements. The results of these two studies indicate that momentary assessments may provide more effective and reliable results in the evaluation of anxiety disorders than traditional measurement methods. Considering that there are often biases in the recall of experiences and emotions related to them, it can be said that the ESM is a method that provides more comprehensive and reliable information in this context. It also makes it possible to measure mood over time; thus it is easier to evaluate time-dependent processes by within-subject design and to make inferences by analyzing them. In addition, the measurement of instant responses may be a guideline on which interventions can be more effective. It has also been found that ESM is also a method used for testing theoretical structures. For example, the theoretical knowledge that rumination is focused on the past and the person, and that anxiety is future-oriented and verbal/linguistic has been proved by the data provided by momentary assessments (Kircanski et al. 2015).

The articles included in this review are merged under some common subjects. For example, emotion-related factors are frequently addressed in GAD and SAD. It is reported that negative emotions are experienced more frequently and positive feelings decrease in both of these disorders. It is also reported that individuals tend to interpret events they experience more negatively, and that negative affect predicts increase in symptom severity. Furthermore, the emotion regulation strategies used are more negative in both disorders (Kashdan et al. 2013, Farmer and Kashdan 2015, Ruscio et al. 2015, Thompson et al. 2016, Naragon-Gainey and DeMarree 2017). These findings seem to be in line with the prevalence of emotion-oriented approaches and the concept of emotion regulation in the literature on anxiety disorders. In addition, in these studies, it is noteworthy that, apart from approaching negative emotions in a non-functional way (eg. problems of discriminating, tolerating emotions and avoiding them), there is an emphasis on lack of positive emotions or lack of diversity. As a matter of fact, it is important to include the positive elements that can be considered in the treatment in parallel with the third wave psychotherapy approaches.

All of the ESM based studies that were reviewed within the scope of the study, evaluations were made by items taken from frequently used measurement tools or open-ended questions on the basis of practical requirements (such as responding quickly to all the questions, not to refrain from filling, not to cause boredom). However, this situation reduces the generalizability of the measurements obtained by the instant methods and makes it difficult to compare the data with other studies. Therefore, the non-standardized measurement tools can be expressed as the biggest limitation of these studies. On the other hand, the presence of only adult sample in all of the studies included in this review is another limitation. It is known that ESM is used to evaluate anxiety symptoms in children and adolescents. In future research, it can be suggested to include the studies conducted with the sample of children and adolescents. In addition, in this review, the researches in which the momentary assessments are used as an evaluation tool are examined. However, the experience sampling method has also been used in recent years as a means of intervention through smartphone applications, online applications and electronic devices. In future reviews, it is also possible to investigate the use of ESM as a means of intervention in different problems. Another limitation of the research is

that the number of articles is limited. The reason for this limitation is to determine the fact that the scanned research was published in 2013 or after the DSM-5 was published as a criterion in order to address the more recent articles. This can also be seen as a powerful aspect of the review in terms of reviewing recent articles. On the other hand, as mentioned before, only the studies with clinical group were included in this review. Considering that the data reported through the clinical group can produce more reliable results in terms of understanding the basis of the disorders and identifying the appropriate treatment approaches, including the sample of the clinical group is other strength of the review. However, the symptoms of anxiety can be seen independently of the diagnosis, there is also a need for research evaluating sub threshold anxiety and worry experienced in daily life by using ESM.

Conclusion

ESM is frequently used in the evaluation of anxiety disorders, and allows for detailed evaluations of symptoms and other related factors. In addition, measurement of other factors affecting the course of the disorder, and testing the theoretical structures, provide a guidance for the intervention programs of the examined disorder. Considering the clinical practice in Turkey, it is known that momentary assessment is often used via tools like daily or momentary follow-up forms for the purpose of evaluating symptoms. However, the use of ESM in various electronic devices such as electronic diaries, handheld computers, software installed on smartphones, other devices, or the Internet has not yet become widespread in Turkey. In the literature, the only empirical study in psychological area was found in the field of industrial/organizational psychology (Erol-Korkmaz 2014). In this study, the emotions of employees and some industrial variables were measured in the form of online survey. However, different tools such as electronic journal, survey and smart phone applications can also be used within the scope of the ESM research. In conclusion, it can be seen that as in other fields, technology has an undeniable impact on psychological evaluation and intervention. In the light of this information, it can be deduced that therapy programs supported with the current tools such as virtual reality, internet or mobile phone applications will increase in the field of application and research. It is thought that such technological applications in both clinical and research field will promote mental health studies.

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