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Generalized Anxiety Disorder Publications: Where Do We Stand a Decade Later?

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Abstract

The purpose of this study was to extend previous work examining publication rates for the anxiety disorders and publication topics for generalized anxiety disorder (GAD). Specifically, we examined anxiety disorder publication rates in MEDLINE and PsycINFO from 1998 to 2008. The results show: 1) that with the exception of panic disorder, there was a significant increase in the annual rate of publications for every anxiety disorder; 2) that GAD had the second lowest annual rate of publications in every year – with no more than 8% of anxiety disorder publications devoted to GAD in any given year; and 3) that GAD publications focused more often on treatment (44%) than on descriptive issues (26%), process issues (22%), and general reviews (8%). Given that citation analysis appears to be a valid indicator of research progress, the current findings suggest that research on GAD continues to lag behind research on most other anxiety disorders.

Keywords: Generalized anxiety disorder; anxiety disorders; publications.

Generalized Anxiety Disorder Publications: Where Do We Stand a Decade Later?

The number of anxiety disorder publications has increased in both absolute and relative terms over the past 25 years (Boschen, 2008). Like most other anxiety disorders, generalized anxiety disorder (GAD) appears to have received increased research attention – at least in absolute terms – since its introduction in DSM-III (American Psychiatric Association [APA], 1980). However, the growth of GAD publications relative to other anxiety disorder publications remains unclear. More importantly, a systematic review of the topics that are addressed in GAD publications (i.e., descriptive issues, process issues, treatment issues, and general reviews) has not been undertaken since 1997. The goal of this study is to examine GAD publication rates and topics from 1998 to 2008. Given that we investigated similar issues from 1980 to 1997 (Dugas, 2000), the current study will provide information on changes that have taken place in the decade following the time period covered by our previous study.

A number of researchers have examined anxiety disorder publication rates over the past 15 years. For example, Norton, Cox, Asmundson and Maser (1995) found that the number of anxiety disorder publications increased dramatically from 1981 to 1990. They also found that panic disorder, obsessive-compulsive disorder (OCD) and posttraumatic stress disorder (PTSD) were the most frequently published anxiety disorders. This latter finding was also reported by Cox, Wessel, Norton, Swinson and Dorenfeld (1995), who examined publication rates from 1990 to 1992. Findings from our previous study (Dugas, 2000) looking at publication rates from 1980 to 1997 were consistent with those of Norton et al. and Cox et al. in that they showed that GAD, social phobia and specific phobia were by far the least published anxiety disorders. More recently, Boschen (2008) examined anxiety disorder publications from 1980 to 2005 and found that the number of publications has steadily grown over the 25 year period. His findings also

show that PTSD (and to a lesser degree, OCD) had the most dramatic increase in publication rates over the period covered by his study.

In all studies reviewed above, the number of GAD publications was considerably lower than the ones for panic disorder, PTSD, and OCD. In fact, Boschen (2008) found that, relative to all other anxiety disorders (with the exception of acute stress disorder), GAD had the lowest number of publications from 1980 to 2005. GAD publications were almost nine times less frequent than PTSD publications and about four times less frequent than panic disorder and OCD publications over the 25 year period. In our previous study (Dugas, 2000), we found that the absolute number of GAD publications had generally increased from year to year from 1980 to 1997. However, although the relative number of GAD publications (relative to other anxiety disorder publications) had increased in the 1980s, it had remained fairly stable in the 1990s. In fact, we found that the percentage of anxiety disorder publications devoted to GAD in the 1990s did not exceed 8.5% in any given year. Thus, data from independent researchers indicate that the number of publications devoted to GAD relative to other anxiety disorders has been modest in the two decades following the inception of GAD in DSM-III (APA, 1980).

In terms of the topics covered by GAD publications from 1980 to 1997, the data show that 57% of GAD publications dealt with descriptive issues (e.g., epidemiology, diagnosis, comorbidity), 31% with treatment issues (e.g., clinical trials, meta-analyses, treatment algorithms), 10% with process issues (e.g., biological substrates, cognitive vulnerability, interpersonal functioning), and 2% presented general reviews (Dugas, 2000). It appears that although we are just beginning to understand the biological, psychological and social factors involved in the etiology of GAD, relatively few publications were devoted to the processes or risk factors implicated in the development and maintenance of GAD. One could argue that

research on the etiology of a condition should normally precede research into its treatment – this does not seem to have been the case for GAD as only 1 of 10 publications addressed process issues whereas 3 of 10 publications dealt with treatment.

The review presented above suggests that GAD has received modest research attention compared to other anxiety disorders. In addition, within the GAD literature, studies of the biological, psychological and social factors involved in the etiology of the disorder are under-represented (at least from 1980 to 1997). Although publication output is only one indicator of research activity, it can be used as a stand-alone marker of research interest. For example, publication rates have been used to measure research interest in the areas of addictions (Zurián, Aleixandre, & Castellano, 2004), personality disorders (Blashfield & Intoccia, 2000), and clinical medicine (Fava, Guidi, & Sonino, 2004). Given that publication rates appear to be a valid indicator of research interest, GAD (and in particular the etiology of GAD) has been understudied from 1980 to 1997. Considering that GAD is highly prevalent, distressing for the individual, and costly to society (see e.g., Wittchen, 2002), the relative lack of research interest in GAD in previous decades is surprising.

The goal of the present study is to extend previous work examining publication rates for the anxiety disorders and publication topics for GAD. Specifically, we will examine anxiety disorder publication rates and investigate the frequency of GAD publications devoted to descriptive, process, and treatment issues, as well as general reviews from 1998 to 2008. It is predicted that: 1) the number of GAD publications will be among the lowest of the anxiety disorders; 2) GAD publications will show increases in absolute terms (the actual number of GAD publications), but *not* in relative terms (the number of GAD publications relative to other anxiety

disorder publications); and 3) most GAD publications will be devoted to descriptive and treatment issues.

Method

Following the procedure used in earlier studies (Dugas, 2000; Norton et al., 1995), we searched MEDLINE and PsycINFO databases from 1998 to 2008. PsycINFO, which is published by the American Psychological Association, includes abstracts from approximately 1300 journals devoted to areas such as social, clinical, cognitive, developmental, and educational psychology, as well as neuropsychology. MEDLINE is published by the U.S. National Library of Medicine, and contains abstracts from 5200 biomedical journals. An overlap of approximately 13% between the two databases has been reported by other sources (Brettle & Long, 2001; Norton et al., 1995). However, in the present study, an overlap of 23.7% was found between MEDLINE and PsycINFO databases for articles devoted specifically to GAD.

In order to identify articles focusing on specific anxiety disorders, we carried out a search using terms from the title, abstract or keywords of the publications. The following search words were used: generalized anxiety disorder, generalised anxiety disorder, GAD; panic disorder, agoraphobia; post traumatic stress disorder, posttraumatic stress disorder, PTSD; obsessive compulsive disorder, OCD; social phobia, social anxiety disorder; simple phobia, and specific phobia. Although the term “social anxiety disorder” was not used in our earlier study (Dugas, 2000), we deemed it important to include this label to guarantee that all abstracts pertaining to this disorder were captured. In addition, we limited our search to English-language abstracts in peer-reviewed journals. When an abstract focused equally on more than one anxiety disorder, it was classified as “multiple anxiety disorders.” When an abstract focused on one anxiety disorder (e.g., GAD) and one non-anxiety disorder (e.g., depression), it was included in the category for

the anxiety disorder (e.g., GAD). However, if the main focus of the abstract was on the non-anxiety disorder (e.g., a study of depression using a GAD group as a clinical control condition), the article was excluded from the review. When an abstract focused on three or more disorders, it was included in the “multiple anxiety disorders” category if more than 50% of the disorders were anxiety disorders (e.g., a study of GAD, social phobia, and avoidant personality disorder). Of note, abstracts included in the “multiple anxiety disorders” category were not also included in other categories (e.g., a study of OCD and PTSD was not also included in the “OCD” and “PTSD” categories). Letters, comments, introductions to special journal issues, and editorials were excluded. Lastly, duplicates within each database were removed.

Following the initial search, GAD abstracts were classified into one of four categories: 1) descriptive issues, 2) process issues, 3) treatment issues, and 4) general reviews and commentaries. Descriptive issues included socio-demographic features (e.g., epidemiology, onset) and clinical features (e.g., diagnostic issues/criteria). Process issues included the form and function of worry, the biological substrates of GAD (e.g., brain structures, neurotransmitters), and the cognitive, behavioral and emotional variables associated with the disorder (e.g., cognitive avoidance, intolerance of uncertainty, emotion dysregulation). Treatment issues encompassed treatment outcome studies (psychosocial and pharmacological), meta-analyses, reviews of treatment issues, as well as recommended pharmacological interventions and algorithms. The final category, general review articles and commentaries, included articles that presented a general review of descriptive, process, and treatment studies concerning GAD. In order to assess the reliability of the categorization procedure, the second author, who was blind to the initial categorization, re-classified 15% of the GAD abstracts in each database.

Results

The first step of the analysis involved calculating the yearly frequency of abstracts for each anxiety disorder, which is presented in Table 1. In general, the rate of publication for anxiety disorders increased from 1998 to 2008 (see Figure 1). In fact, there was a statistically significant increase in the number of publications for PTSD ($\beta = .97, p < .001$), OCD ($\beta = .96, p < .001$), social phobia ($\beta = .94; p < .001$), specific phobia ($\beta = .90, p < .001$), and GAD ($\beta = .83, p < .005$). We found a statistically significant *decrease* in number of publications for only one anxiety disorder; namely, panic disorder with/without agoraphobia ($\beta = -.79, p < .005$).

By far, the most commonly studied anxiety disorder between 1998 and 2008 was PTSD (8147 abstracts in PsycINFO and MEDLINE). This was followed by OCD (4813 abstracts) and panic disorder (3374 abstracts). The disorders that received the least amount of attention during this period were specific phobia (642 abstracts), GAD (1252 abstracts) and social phobia (2134 abstracts). We then calculated the annual percentage of GAD publications across both databases relative to all anxiety disorder publications. These results are depicted in Figure 2. Of all anxiety disorder abstracts, the annual percentage of those focusing specifically on GAD varies from 3.3% to 8.0%.

The second step of the analysis involved the classification of GAD abstracts into one of four categories: 1) descriptive issues, 2) process issues, 3) treatment issues, and 4) general reviews (see Table 2). As mentioned previously, the inter-rater agreement was calculated for these categories based on a re-classification of 15% of GAD abstracts. Inter-rater agreement was $\kappa = .78$ (85% agreement). The results indicated that treatment issues accounted for the greatest number of GAD abstracts. Descriptive and process issues received comparable attention, although considerably less than treatment issues. Relative to the other three categories, general reviews were less frequent.

Discussion

The results of this study show that, from 1998 to 2008: 1) there was an increase in the annual rate of publications for every anxiety disorder except for panic disorder with/without agoraphobia; 2) GAD had the second lowest annual rate of publications in every year; and 3) GAD publications focused more often on treatment than on descriptive issues, process issues, and general reviews. Thus, the first and second hypotheses (that the rate of GAD publications would be among the lowest of the anxiety disorders, and that GAD publications would show increases in absolute terms, but *not* in relative terms) were supported. However, the third hypothesis, that most GAD publications would be devoted to descriptive and treatment issues, was only partially supported.

As mentioned above, with the exception of panic disorder, we found a statistically significant increase in the rate of publications for every anxiety disorder. PTSD had both the highest number of publications and the greatest increase in the rate of publications over the period covered by this study. This finding is consistent with those reported by Boschen (2008), who found that PTSD was the most published anxiety disorder from 1980 to 2005. However, our finding stands in contrast to those of earlier studies showing that panic disorder had the highest rate of publications of the anxiety disorders in the 1980s and early 1990s (Cox et al., 1995; Dugas, 2000; Norton et al., 1995). Thus, it appears that the anxiety disorders literature has shifted in the past 30 years; specifically, its primary focus has moved from panic disorder to PTSD. Of course, the current finding that panic disorder is the only anxiety disorder with a negative slope for rate of publications from 1998 to 2008 is in line with this shift in the literature.

Why does panic disorder attract less research attention today than in previous years? One reason may be that the intensive research in previous decades has “paid off.” Panic disorder

with/without agoraphobia is now the most successfully treated anxiety disorder with cognitive-behavioral methods, with reported short- and long-term remission rates as high as 85% (Clark et al., 1994; Craske, Brown, & Barlow, 1991). Although many other reasons (e.g., funding agency priorities, media coverage) may help explain the decrease in the number of panic disorder publications over the past 10 to 15 years, we suggest that the advances that have been made in the understanding and treatment of panic disorder have led some researchers to focus on other anxiety disorders.

Returning to the issue of GAD publications, the present findings are consistent with those of previous studies; namely, GAD has been – and continues to be – one of the least published anxiety disorders. Although the rate of GAD publications increased in absolute terms from 1998 to 2008, it did not increase in relative terms. In fact, in every year covered by the study, only specific phobia had a lower number of publications than GAD. Given that it is now well established that GAD has a high prevalence rate, leads to considerable distress and interference with daily living, and is costly to society (see e.g., Wittchen, 2002), it is surprising that it remains understudied. In our opinion, the relative lack of research interest in GAD can be explained by a host of factors, some of which are discussed below.

First, it may be that perceptions of GAD as a mild condition that leads to minimal distress (e.g., Rapee, 1991) continue to turn researchers away from its study. In fact, in the 1980s and early 1990s, some studies suggested that GAD was associated with relatively little impairment (Wittchen, Essau, & Krieg, 1991) and that individuals with GAD do not urgently require treatment (Noyes et al., 1992). In this perspective, the term “worried-well” has been used to describe the presumed high functional status of those with GAD. Interestingly, recent studies of the personal and social costs of GAD have revealed a very different picture. For example,

Hoffman, Dukes, and Wittchen (2008) reviewed 34 studies of the human and economic costs of GAD and found that: 1) pure (non-comorbid) GAD was associated with significant physical and emotional impairment; 2) GAD led to impairments in quality of life that were greater than those resulting from substance use disorders and comparable to those ensuing from other anxiety disorders and somatoform disorders; 3) GAD led to role impairments that were similar in magnitude to those resulting from major depressive disorder; and 4) GAD was associated with high economic costs, which were mainly attributable to lost work productivity and the frequent use of health care resources. Thus, the weight of the evidence suggests that perceptions of individuals with GAD as the “worried well” are both outdated and inaccurate.

Second, the amount of research on the biological determinants of GAD may be limited by the fact that genetic vulnerability appears to play a minor and non-specific role in the etiology of GAD (about 15%; see Rygh & Sanderson, 2004, for a review). In other words, at this time, it does not appear that biomedical research on the genetic predisposition to develop GAD will produce robust models of causality. Third, GAD does not typically benefit from intensive media coverage. Given that GAD is less closely tied to world events than other disorders (e.g., PTSD) and that its symptoms are typically less “striking” than those of other disorders (e.g., panic disorder, OCD), GAD is not often the subject of media reports. Finally, GAD is (arguably) less suited to experimental laboratory-based study relative to other disorders that have clear behavioral and motoric avoidance patterns which can be directly observed as dependent variables. For example, the hallmark of GAD – chronic, excessive and uncontrollable worry and anxiety – can be challenging to study in laboratory conditions. By contrast, the laboratory context has been used repeatedly to provoke and study panic attacks using the CO₂ challenge (e.g., Bernstein, Zvolensky, Marshall, & Schmidt, 2009) as well as compulsive checking

behavior using virtual environments (e.g., van den Hout & Kindt, 2003). We suggest, however, that the factors presented above only make the study of GAD more challenging, at least from a comprehensive biopsychosocial perspective. Keeping in mind that intense research on panic disorder in the 1980s and 1990s led to great advances in our ability to treat affected individuals, it seems clear that increased research on GAD is desirable considering the limited success of even the best psychological treatments for the disorder (see Fisher, 2006, for a review).

The findings of the present study also show that 44% of GAD publications were devoted to treatment issues, 26% to descriptive issues, 22% to process issues, and 8% to general reviews. In our earlier study (Dugas, 2000), we found that 57% of GAD publications focused on descriptive issues, 31% on treatment issues, 10% on process issues, and 2% on reviews. Thus, it appears that the GAD literature has also shifted, with research on treatment now making up almost half of the GAD publications. Considering that a number of psychological and pharmacological treatments for GAD have been developed over the past decade (e.g., Allgulander, Hackett, & Salinas, 2001; Mennin, Heimberg, Turk, & Fresco, 2002), the increase in treatment outcome research is not surprising. Conversely, the percentage of publications devoted to descriptive issues has decreased by more than half, from 57% to 26%. Again, this is not entirely surprising, as the first study covered the period from 1980 to 1997. During that time, the diagnostic criteria of GAD underwent a number of important changes, the validity of the diagnostic category of GAD was often called into question (e.g., Tyrer, 1984), and the place of GAD within the DSM (Axis I versus Axis II) was frequently questioned (e.g., Garvey, Cook, & Noyes, 1988). In fact, GAD was the subject of considerable debate during the evaluation and revision of its diagnostic criteria by the GAD Subcommittee of the DSM-IV Anxiety Disorders Work Group (Brown, Barlow, & Liebowitz, 1994). Given that many of these controversies have

subsided over the past decade (Dugas & Robichaud, 2007), it follows that the research on the sociodemographic and clinical features of GAD (i.e., descriptive issues) has also subsided. It bears noting, however, that additional descriptive research on the personal and social costs of GAD is needed to challenge outdated perceptions of GAD as a mildly distressing condition that incurs minimal social costs (see above). In particular, such perceptions should be challenged with data from new studies using sophisticated cost-of-illness calculations (for a review, see Konnopka, Leichsenring, Leibing, & König, 2009).

The current findings also show that the percentage of publications devoted to process issues has more than doubled since our previous study (Dugas, 2000), growing from 10% to 22%. Considering that the absolute number of GAD publications has significantly increased from 1998 to 2008, the actual amount of research on the processes involved in GAD has increased all the more. Given that process research is necessary to advance our understanding of the factors involved in the development and maintenance of GAD (and to increase our ability to prevent and treat the disorder), the growth of process research can be considered to be a positive shift in the GAD literature. Finally, general reviews continue to make up a small portion of GAD publications (less than 10%). The increase from 2% to 8% in our consecutive studies may simply reflect that fact that general reviews of the extant data are increasingly needed as the field learns more about the phenomenology, etiology, and prevention/treatment of GAD.

The current study has two main limitations, both of which have to do with our goal of following-up on our earlier study (Dugas, 2000) using similar methods. First, we did not include the Web of Science database in our search strategy – only MEDLINE and PsycINFO were used. Although others (e.g., Mendlowicz, Braga, Cabizuca, Land, & Figueira, 2006) have included all three databases in their searches, we elected to restrict our search to MEDLINE and PsycINFO to

replicate our previous methods and to be in a position to compare the findings of both studies. Second, we did not include acute stress disorder in our search. Again, although others have included acute stress disorder in their searches (e.g., Boschen, 2008), we chose not to include it so as to be consistent with our earlier study. It should be noted, however, that Boschen found that acute stress disorder was by far the least published anxiety disorder, with only 122 articles found over a period of 25 years.

Taken together, the findings show that from 1998 to 2008, the number of GAD publications increased steadily, the percentage of anxiety disorder publications devoted to GAD was consistently low (no more than 8% in any given year), and over 40% of GAD publications focused on treatment issues. Considering that citation analysis appears to be a valid indicator of research progress (Fava et al., 2004), the main conclusion of the current study is that research on GAD continues to lag behind research on most other anxiety disorders, some of which are considerably less prevalent and no more costly than GAD.

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Table 1

Number of Anxiety Disorder Abstracts in PsycINFO and MEDLINE from 1998 to 2008

| Year | <u>GAD</u> | | <u>PD/AG</u> | | <u>PTSD</u> | | <u>OCD</u> | | <u>Soc Ph</u> | | <u>Spec Ph</u> | | <u>Multiple</u> | |
|------|------------|-----|--------------|-----|-------------|-----|------------|-----|---------------|-----|----------------|-----|-----------------|-----|
| | Psy | Med | Psy | Med | Psy | Med | Psy | Med | Psy | Med | Psy | Med | Psy | Med |
| 1998 | 24 | 32 | 167 | 229 | 208 | 230 | 132 | 166 | 62 | 54 | 8 | 33 | 46 | 53 |
| 1999 | 22 | 28 | 128 | 184 | 246 | 259 | 151 | 171 | 71 | 67 | 11 | 30 | 34 | 60 |
| 2000 | 40 | 44 | 128 | 181 | 291 | 328 | 151 | 181 | 79 | 83 | 9 | 34 | 37 | 64 |
| 2001 | 64 | 74 | 153 | 169 | 307 | 305 | 179 | 182 | 105 | 88 | 13 | 34 | 64 | 74 |
| 2002 | 62 | 54 | 146 | 183 | 339 | 333 | 151 | 162 | 102 | 76 | 15 | 40 | 53 | 77 |
| 2003 | 60 | 72 | 125 | 154 | 376 | 386 | 212 | 216 | 99 | 90 | 17 | 45 | 49 | 81 |
| 2004 | 51 | 44 | 141 | 167 | 394 | 423 | 229 | 235 | 116 | 110 | 15 | 37 | 55 | 99 |
| 2005 | 75 | 64 | 148 | 163 | 395 | 412 | 255 | 277 | 104 | 92 | 13 | 43 | 76 | 114 |
| 2006 | 61 | 62 | 133 | 150 | 466 | 530 | 284 | 275 | 123 | 127 | 16 | 56 | 74 | 116 |
| 2007 | 66 | 75 | 126 | 158 | 422 | 541 | 308 | 305 | 108 | 126 | 20 | 72 | 61 | 136 |
| 2008 | 69 | 109 | 75 | 166 | 357 | 599 | 213 | 378 | 102 | 150 | 16 | 65 | 59 | 121 |

Note. GAD = generalized anxiety disorder; PD/AG = panic disorder with or without agoraphobia; PTSD = posttraumatic stress disorder; OCD = obsessive-compulsive disorder; Soc Ph = social phobia; Spec Ph = specific phobia; Multiple = multiple anxiety disorders; Psy = PsycINFO; Med = MEDLINE.

Table 2

Number and Percentage of GAD Abstracts in Each Publication Category

| Category | <i>n</i> | % |
|-------------|----------|------|
| Descriptive | 243 | 25.9 |
| Process | 209 | 22.3 |
| Treatment | 412 | 43.9 |
| Review | 75 | 8 |

Note. “Descriptive” includes socio-demographic and clinical features; “Process” includes the form and function of worry, the biological substrates of GAD, and the cognitive, behavioral and emotional variables associated with the disorder; “Treatment” includes treatment outcome studies, meta-analyses, reviews of treatment issues, and recommended pharmacological interventions and algorithms; “Review” includes general reviews of descriptive, process, and treatment studies concerning GAD.

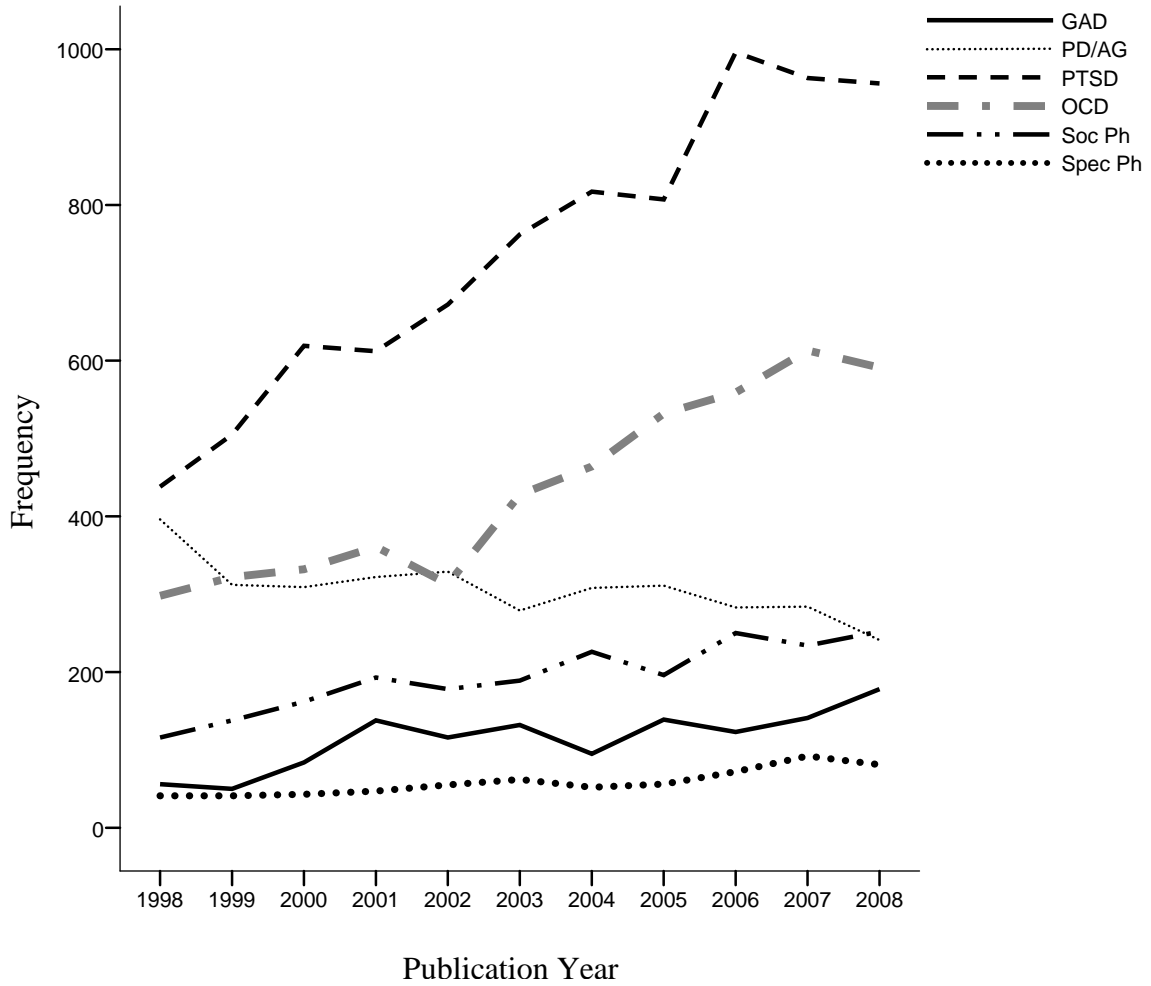


Figure 1. Annual frequency of anxiety disorder publications, from PsycINFO and MEDLINE combined, between 1998 and 2008.

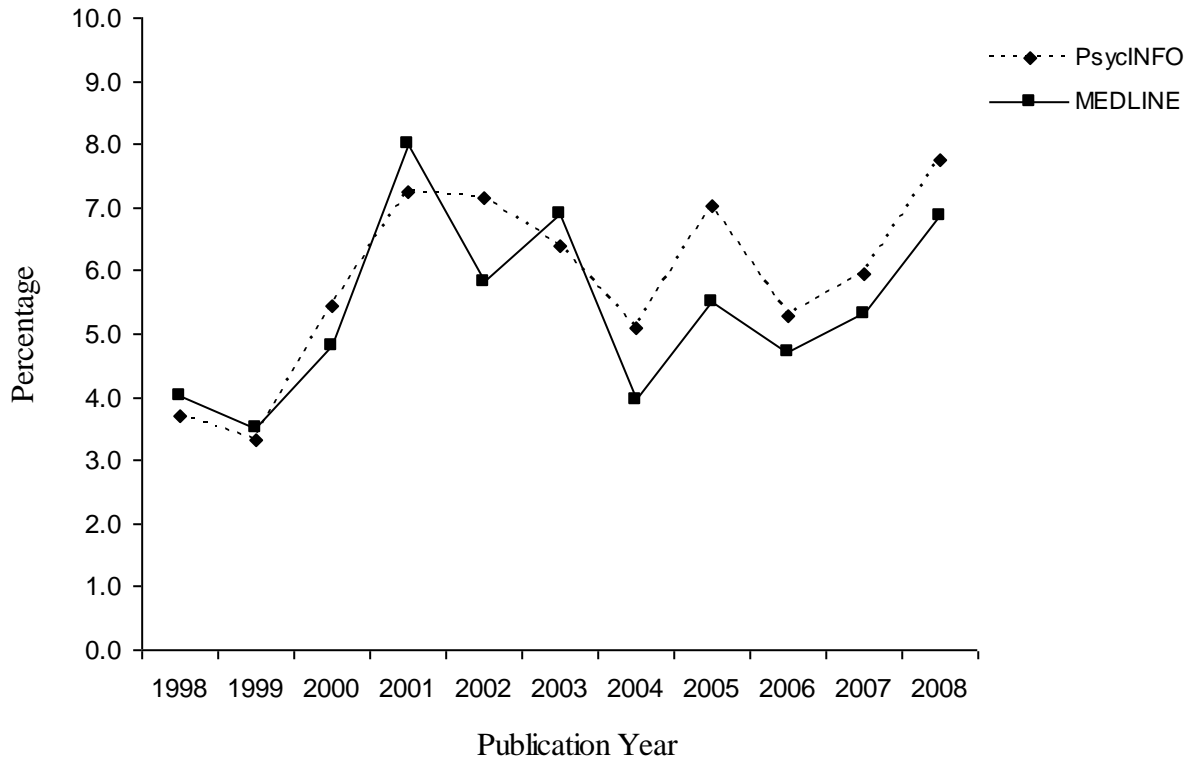


Figure 2. Annual percentage of GAD publications relative to all anxiety disorder publications.