Big data study for coping with stress

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Abstract. Coping strategies in response to perceived stress have been studied for decades producing an interesting mix of arguments. A relatively large psychological database of nearly 17000 responses, captured on Anxiety Online, an online clinic for the diagnosis and treatment of anxiety disorders, provides a new opportunity to address two of these arguments. Issues of particular interest include the importance of multiple tactics for coping with stress, with claims that both problem-focused and emotion focused coping strategies are generally applied simultaneously, despite the clear separation of these two types of coping strategy in terms of effectiveness and situation that is found in the literature. A second argument concerns the relationship between coping behaviours and mental health outcomes, sometimes with a reciprocal relationship acknowledged but more often with mental health outcomes seen as the result of coping behaviours, allowing the use of learnt coping behaviours as a means of improving mental health. In this study we address these issues by using cluster analysis to define the common groupings of coping behaviours found in the Anxiety Online database. The relationship between these coping behavior clusters are explored in terms of demographics, mental health diagnostics and support. However, instead of using coping behaviours to predict mental health outcomes we consider the effect of coping behaviours on the resolve and confidence of clients to make improvements in their mental health. The results suggest that emotion/avoidant coping is less effective than other coping strategies and that multiple coping strategies are more likely for more severe stress.

Keywords. Mental Health Management, Coping with Stress, Online Mental Health Diagnosis, Mental Health Support.

Introduction

General psychological models for perceived stress and coping commonly refer to either problem- or emotion-focused coping. In problem-focused coping an individual engages in behaviours to specifically address the sources of stress, such as visiting a doctor or talking to a friend, while in emotion-focused coping an individual engages in behaviours such as crying or eating to alleviate the emotional distress caused [1]. However, a third style for coping with perceived stress, namely avoidant-focused coping, involving avoiding confrontation with the stress-factor, is also commonly recognised [2,3]. More recently an additional style of coping, detached coping, has been identified, in which the individual tries to temporarily remove themselves from the problem in order to reduce their emotional response [4]. Both problem-focused coping and detached coping styles are commonly regarded as efficient, while the emotional and avoidant coping styles are usually regarded as inefficient [4].

However, other studies show more complexity in regard to the relationship between choice of coping strategies and their efficacy. In particular it has been found that individuals typically use multiple coping tactics with the use of both problem-focused and emotion-focused strategies for 98 percent of 1300 stressful episodes in one study [5]. A greater number of coping responses can be expected when the stress is perceived as being more severe [6], with problem-solving coping more likely when demands are appraised to be controllable, and emotion-focused coping more likely when demands are appraised to be more uncontrollable [2,7]. Studies have consistently shown that choices in regard to coping styles differ between men and women with women favouring emotion-focused methods and men favouring problem-focused methods. In addition it has been found that people with low education and income are more likely to employ ineffective coping strategies [8].

However, there is argument about which coping strategies are most effective for decreasing psychological distress [9,10], and in some situations it has been found that emotion-focused coping strategies are more effective than problem-solving-focused coping strategies. In particular, some emotion-focused strategies such as denial and alcohol use have been found to be beneficial, but only in the short-term [10]. It has also been found that the immediate and long-term effects of avoidance coping differ, being more beneficial than other coping strategies, but only in the short-run [11]. The way in which efficacy is measured is critical in all these studies. Studies of relationships between perceived stress, coping behaviours and mental health outcomes have often found reciprocal relationships, with coping choices sometimes being dictated by levels of stress and sometimes increasing stress levels. So in the short-term it seems best to consider other outcome measures, such as the usage of critical health-related services [12].

1. Method

Anxiety Online (now Mental Health Online) is a system for the diagnosis and treatment of anxiety disorders. Between October 2009 and June 2013 close to 17000 valid entries were obtained by the Anxiety Online system, allowing the use of data mining methods in an area where this is seldom possible. The data contained responses for 15899 distinct email addresses, with 1100 repeat logins from 862 clients. Respondent confidentiality meant that no check of client legitimacy in terms of mental health problems was possible. In addition to data relating to the diagnosis of 21 mental health disorders, comprehensive demographic and contextual data was collected for each client. In particular, data were collected for the methods used by clients to handle stress with the following options; alcohol, substances, exercise, talk with friends and family, medical doctor, hobby, meditate, other. The “other” category included mostly emotion-focused strategies such as crying, sleeping, eating, self-harm or withdrawal. A Yes/No response was elicited for each of these actions. In addition the number of diagnoses and a K6 measure of psychological distress [13] were extracted, together with level of support from family and community, using a Yes/No response, and the existence of current or previous mental health assistance (now, in last month, previously, never). These variables together with demographic data were considered as the drivers of coping strategies, with outcome measures relating to resolve to make changes in regard to mental health management, measured on a 4-point scale, and confidence in ability to make these changes, measured on a 5-point scale. This model is illustrated in Figure 1.

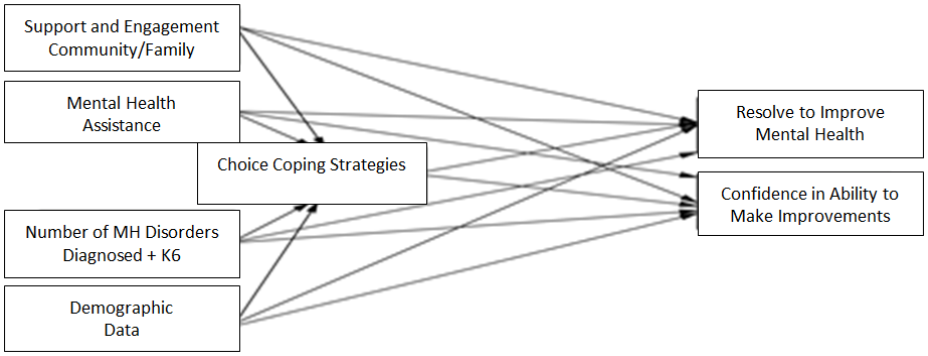

Figure 1: Conceptual Model

The studies described previously have tended to use scales to measure the use of strategies for coping with stress. Correlation and regression analyses have then been applied to test hypotheses using relatively small sample sizes. In contrast the relatively large data set available in the current study allows the grouping of the binary coping responses using a two-stage cluster analysis [13]. Each grouping was named in accordance with the most common coping actions. Nominal logistic regression was then used to evaluate the strength of the relationship between these groupings and the driver variables; support and engagement with family and community, mental health assistance, mental health diagnoses (K6 and number of diagnoses) and demographic data (gender, age, marital status, tertiary education and employment status). Finally nominal logistic regression analyses were used to test for mediation effects by the choice of coping strategies between these drivers and the two dependent variables; resolve to improve mental health and confidence in ability to do so.

2. Results

As shown in Table 1, nine clusters emerged, each with a good representation in terms of response numbers but not in terms of the number of activities used for coping. The Emotion/Avoidant cluster comprised a mix of "other" coping strategies, so no activity number was possible for this cluster. However, for the other clusters there was some variation in terms of the number of activities, with two of the clusters (Logical GP and Avoidant Substance) employing at least eight coping activities. However, clients in the Logical F&F Talk cluster used only this single coping activity.

The characteristics of the coping clusters were analysed using univariate and then a multivariate analysis, producing odds ratios relative to the first Emotion/Avoidance cluster as shown in Table 2. These regressions showed highly significant differences between the clusters for all the driver variables confirming the associations between coping strategy choices and support/engagement with family and community, mental health assistance, mental health diagnoses (K6 and number of diagnoses) and demographic data (gender, age, marital status, education and employment status). Odds ratios above one indicate higher probabilities of cluster membership compared to the Emotion/Avoidant cluster, while odds ratios below one indicate lower probabilities of cluster membership compared to this cluster.

Table 1: Clusters for Coping (* F&F Friends and Family)

Cluster	% Responses per Coping Activity								Number	
	Alco-hol	Sub-stances	Exer-cise	Talk F&F*	Family Doctor	Hobby	Medi-tate	Other (+)	Responses	Coping Activities
Emotion/Avoidant	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100	2620	?
Logical GP	24.9	2.8	38.4	65.9	100.0	27.4	22.0	16.2	1600	8+
Detached/Avoidant	26.4	0.0	35.6	53.3	0.0	29.5	14.5	100	1816	6+
DetachedMeditation	20.1	0.0	52.0	56.4	0.0	34.4	100.0	0.0	1407	5
Avoidant Substance	45.4	100	22.0	35.3	11.0	19.9	11.0	15.5	1210	8+
Detached Exercise	29.0	0.0	100	51.2	0.0	27.9	0.0	0.0	2674	4
Avoidant Alcohol	100	0.0	0.0	33.4	0.0	18.2	0.0	0.0	1537	3
Logical F&F Talk	0.0	0.0	0.0	100	0.0	0.0	0.0	0.0	2337	1
Detached Hobby	0.0	0.0	0.0	27.8	0.0	100	0.0	0.0	1798	2
Total	23.7	7.4	29.0	46.8	10.2	26.6	12.7	28.7	16999	

Table 2: Univariate Nominal Logistic Regressions for Coping Clusters (* p<.001)

	Odds Ratios for Coping Clusters Relative to Emotion/Avoidant Cluster (1)								
Characteristics of Coping Clusters	Emotion /Avoidant (1)	Logical GP (2)	Detached/ Avoidant (3)	Detached Meditation (4)	Avoidant Substance (5)	Detached Exercise (6)	Avoidant Alcohol (7)	Logical F&F Talk(8)	Detached Hobby (9)
No/Yes Support	1.00	.58*	.65*	.38*	1.08	.40*	.73*	.41*	.67*
Never/Now Access MH	1.00	.14*	.55*	.85*	.53*	1.56*	1.35*	1.34*	1.47*
K6	1.00	.96*	.95*	.86*	1.04*	.88*	.96*	.90*	.92*
# Disorders	1.00	1.00	.96	.79*	1.29*	.79*	1.06*	.83*	.86*
Male/Female	1.00	1.07	.82	1.31*	1.28*	1.65*	1.76*	.66*	1.69*
Married/Other	1.00	1.18	.86	1.22	.50*	.95	1.03	1.00	.84
Single/Other	1.00	.85	1.01	.85	.92	.82	.86	.61*	1.34*
Cohab./Other	1.00	1.01	.79	.98	1.05	.98	1.07	.98	.87
Employ FT /Other	1.00	1.14	1.00	1.40*	.95	2.03*	1.90*	1.30*	.94
Employ PT /Other	1.00	1.16	1.13	1.39*	1.00	1.70*	1.32*	1.46*	1.02
No/Yes Degree	1.00	.76	.66*	.45*	1.18	.43*	1.00	.81	.99
Age<25/>45	1.00	.42*	.99	.40*	1.49*	.69*	.59*	1.52*	2.12*
Age<35/>45	1.00	.87	1.09	.57*	1.61*	1.04	.99	1.70*	1.52*
Age<45/>45	1.00	.87	1.00	.70*	1.21	.86	.99	1.33*	1.08

Table 2 shows that in comparison to the first cluster (Emotion/Avoidant), the members of seven clusters (2,3,4,6,7,8,9) are significantly better supported/engaged with family and community, the members of 4 clusters have significantly better access to mental health assistance (2,3,4,5) while the members of the other 4 clusters (6,7,8,9) have significantly worse access to mental health assistance. In terms of the K6 the members of all but the fifth cluster (Avoidant Substance) are identified by lower distress scores than the first cluster. However, the members of 4 of the other clusters (4,6,8,9) have lower numbers of diagnosed disorders while the members of two clusters (5 and 7) have more diagnosed disorders than the first cluster. In terms of demographics there are also important differences between the clusters.

Compared to the first cluster the members of five clusters (4,5,6,8,9) are more likely to be male but the members of cluster 8 (Logical F&F Talk) are more likely to be female. The members of the fifth cluster (Avoidant Substance) are less likely to be married while the members of clusters 8 and 9 (Logical F&F Talk and Detached

Hobby) are more likely to be single than the members of cluster 1. Members of four clusters (4,6,7,8) are more likely to be employed than the members of cluster 1. Also, compared to cluster 1, members of three clusters (3,4,6) are less likely to have completed a degree. Finally, compared to cluster 1, the members of 4 clusters (2,4,6,7) tend to be older and the members of 3 clusters (5,8,9) tend to be younger.

Now considering the two dependent variables a 2-stage nominal logistic regression analysis was conducted with the above cluster characteristics entered at stage 1 and the cluster variable entered at stage 2. For confidence in ability to improve mental health management there was a significant improvement in the model fit when the coping clusters were added (Chi-Square = 172, df=24, p<.001) with a similar result for resolve to improve mental health (Chi-Square = 365, df=24, p<.001). In all these models all the characteristics were significant except for employment status, due to mediation by education with fewer degreed people employed than people without degrees. Table 3 compares the resolve to improve mental health and the confidence to do so for the nine clusters, again using the Emotion/Avoidant cluster as the reference cluster, while controlling for the stage 1 characteristics.

Table 3 shows that in comparison with members of the first cluster (Emotion/Avoidant), members of seven clusters (2,3,4,5,6,8,9) have significantly higher odds of having good rather than poor confidence in their ability to improve their mental health. In addition, in comparison with the first cluster, four clusters (2,3,4,6) are significantly more likely to be currently engaged with improving their mental health, with members in three of these clusters (2,3,4) more likely to be in need of help have recently relapsed.

Table 3: Odds Ratios for Coping Clusters while Controlling for Stage 1 Characteristics (* p<.001)

		Odds Ratios for Coping Clusters Relative to Emotion/Avoidant Cluster		
Cluster Number	Cluster	Good versus Poor Confidence to Manage Mental Health	Making Improvements in Mental Health Now Versus No Interest	Relapsed Need Help to Improve Mental Health Versus No Interest
1	Emotion/Avoidant	1.000	1.00	1.00
2	LogicalGP	1.60*	4.61*	4.19*
3	Detached/Avoidant	1.52*	2.24*	1.78*
4	Detached Meditation	2.69*	4.88*	2.79*
5	Avoidant Substance	1.67*	1.45	1.00
6	Detached Exercise	1.97*	2.16*	1.40
7	Avoidant Alcohol	1.18	1.31	.91
8	Logical F&F Talk	1.44*	1.47	1.40
9	Detached Hobby	1.60*	1.42	1.04

3. Discussion of Implications and Conclusions

The results show strong support for the model suggested in Figure 1 and some support for the complexity of the relationship between choice of coping strategies and their efficacy. There is support for the view that Emotion/Avoidant styles of coping tend to be less effective than problem-solving approaches in that our first cluster is associated with the lowest level of confidence regarding the management of one's mental health. There is also support for the view that individuals typically use multiple coping tactics and that this tendency will be stronger when the stress is perceived to be more severe. The Avoidant Substance cluster had the highest level of distress as measured by the K6

and had the highest number of disorders diagnosed, and more than eight coping activities were utilised by clients in this cluster. The Logical GP cluster also used more than 8 coping activities and this cluster also had a relatively high number of diagnoses. The results confirm that women are more likely to favour Emotion/Avoidant (and Detached/Avoidant) coping activities than males, but the results for education suggest that detachment is a more common coping strategy for degreed clients. Also, despite no evidence of age effects in the literature, this study shows that Substance and Alcohol Avoidance and Talking with Friends and Family are more common in younger people.

Although the literature suggests no consensus about the optimum coping strategies for decreasing psychological distress, this study suggests that Emotion/Avoidant coping is indeed less effective than other strategies, if confidence and resolve regarding mental health management are adequate indicators of mental health. However, although this is a very large sample of data it represents only people who have chosen to seek online help for mental health issues, and the results may therefore not reflect the reality for a wider sample of clients. In addition only seven categories and an 'Other' category were considered for coping activity, with only a 'Yes/No' response for each category. A more sensitive response scale with more categories may have been more illuminating. Finally, more robust outcome measures, such as a reduction in stress episodes should be considered in future research. Despite these limitations this study shows the advantages of a relatively large database in a study of this nature. A full picture of coping with stress has been captured for the first time.

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