Depression and Health Behaviours: The importance of acknowledging the relationship.

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Paper Presented at the
14th International Mental Health Conference
Surfers Paradise, Gold Coast (QLD) 5-7 August 2013
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ABSTRACT: There has been an increased focus internationally on the identification and prevention of clinical depression. Individuals exhibiting moderate depressive symptoms, but not meeting thresholds for clinical diagnosis, are not considered to have a mental illness. Nevertheless these individuals experience psychological distress and risk symptoms worsening to clinical levels. Furthermore, research indicates individuals who experience mental illness have increased risk of chronic disease and the associated morbidity contributes to the development and worsening of psychological symptoms. However, the mechanisms underpinning the convergence of physical and psychological health are still being explored.

The current study examined the relationship between protective health behaviours and depressive symptomatology in an Australian population, by focussing on the apparent differences in lifestyle approaches for those showing mild, moderate and severe levels of depressive symptoms. A sample of 1935 Australians, aged 18 to 91, participated in an online survey examining alcohol consumption, sleep hygiene, smoking, physical activity and fruit and vegetable consumption. Depressive symptomatology according to the Center for Epidemiologic Studies Depression Scale (CES-D) was categorised into mild, moderate or severe, where severe symptomatology is consistent with a diagnosis of major depression.

The results indicated a significant trend for poorer health behaviours with increasing levels of symptomatology, and significant differences in protective health behaviours across the three symptom categories. Worsening of depressive symptoms was accompanied by a decrease in protective health behaviours, and a rise in maladaptive behaviours. The study suggests that individuals with clinical depression, and those who do not meet the clinical threshold, may benefit from health behaviour interventions. Furthermore, health behaviour interventions targeted at individuals exhibiting moderate depressive symptomatology have the potential to protect against progression of symptoms to clinical diagnostic levels.

Keywords: Depression, health behaviours, prevention, mental health, physical health

Introduction

The definition of mental health proffered by the World Health Organisation (WHO, 2004) perfectly conceptualises the notion that mental health is not merely the absence of mental illness. In their first report on health promotion, WHO (2004, p.12) defined mental health as “a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community”. This definition supports the notion that mental health
is characterised by the presence of something positive and not merely the absence of something negative and supports the argument that, while correlated, positive and negative experiences occupy two separate continuums of experience. Consequently, treatments and interventions which focus on the lessening of symptoms associated with mental illness, do not and will not necessarily result in an increase or change in mental health.

American psychologist Corey Keyes (2006), argues that for an individual to be mentally healthy, aspects of their emotional, psychological and social well-being interact and complement each other. He describes flourishing as a state where individuals combine a high level of subjective well-being with an optimal level of psychological and social functioning. Keyes suggests that flourishing, coupled with the absence of mental illness is representative of complete mental health, and consequently, is more functional and adaptive than moderate mental health, or simply the absence of mental illness. Keyes also indentified a state called languishing. While the term has quite negative overtones, the concepts underlying it are quite important. Individuals identified in this state have low levels of mental health – that is they are low in subjective well-being, however they show moderate-high levels of mental illness, but their symptomatology does not meet the threshold for diagnosis. When considered in the context of disorders such as depression, it is these individuals who, if able to be identified, may benefit most from programs targeting prevention of mental illness and the promotion of better mental health.

*The Relationship between Mental Health and Physical Health*

Rates of depression across the world continue to rise, and WHO predicts that by 2030, depression will account for the highest level of disability accorded any physical or mental disorder in the world (WHO, 2008). In Australia, 6% of adults are affected by depression in any one year (AIHW, 2010) and 20% of adults are affected at some point during their lifetime (Manicavasagar, 2012), with females (1 in 4) having a slightly higher diagnosis rate than males (1 in 6). Of additional concern is that individuals suffering from a mental illness, also have a heightened prevalence of chronic physical disorders compared to the general population (Scott & Happell, 2011; Scott et al., 2012). Furthermore, Scott and Happell indicated that the longevity of mental health consumers is worsening compared to the general population, illustrating the need to consider both mental and physical health in combination.

The relationship between mental illness and physical health appears to be bi-directional, and increasing evidence suggests the importance of acknowledging and exploring this relationship in more detail. McConell, et al., (2005) reported that individuals with depression have 4 ½ times the risk of developing coronary artery disease compared to
individuals without depression. Similarly, but from the opposite perspective, Clarke (2009) reported that individuals with a chronic disease are at heightened risk for depression, and that severity of depression is significantly associated with the severity of disease. As such, while the mechanisms which underpin this relationship are yet to be fully explained, it is clear that individuals suffering from depression are at increased risk of chronic disease, and equally, that the morbidity associated with chronic illness can contribute to the worsening of depressive symptomatology.

While examining the impact of individual risk factors on mental health is not a new concept, the examination of their combined influence on specific disorders is less well defined, particularly in an Australian context (Harrington, Gibson & Cottrell, 2009). Studies have found that a wide variety of factors, including socio-demographics, health status, lifestyle and social networks contribute to the incidence of depression (Cole & Demdukuri, 2003). Similarly, health status, including the presence of depression, has been found to be a significant predictor of poor lifestyle choices (Killeen, 1989). In the same way, depressed individuals are considered to be more self-neglecting than their non-depressed counterparts and subsequently tend to lead less healthy lifestyles (Bodnar & Wisner, 2005).

**Mental Illness and Lifestyle Factors**

According to Kilbourne et al. (2007) people with serious mental illnesses demonstrate unhealthy eating patterns and are 30% more likely than those in the general population to consume only one meal per day. A survey of 363 German patients with a serious mental illness revealed that participants were more likely to report never eating fruits and vegetables, but to eating fast food, salty snacks and sweets everyday than individuals in the general population (Kilian, et al., 2006). Similarly, in an Australian survey of 40 consumers living in a mental health facility, fruits and vegetables were never consumed by 48% and 38% of respondents respectively, and only 5% reported consuming enough fruit and vegetables to meet dietary recommendations (Wallace & Tennant, 1998). It has also been shown that depression can lead to disordered eating, including patterns of overconsumption (Liu et al., 2007) and poor dietary intake (Guo, Warden & Paeratakul, 2004). According to Bodnar and Wisner, depressed individuals may be more likely to experience deficiencies in important dietary nutrients, including folate, vitamin B-12, selenium, zinc and iron, suggesting lower prevalence of a varied diet compared to the general population.

Roshanaei-Moghaddam et al., (2009) found that depression was a significant risk factor for the development of sedentary lifestyle or decreased level of physical activity. Higher rates of sedentary lifestyle and non-adherence to regular exercise programs in depressed patients can be partly explained by the association of depression with decreased...
motivation and energy. Similarly, it is becoming increasingly clear that an association between smoking and depression exists, as depression is over represented among smokers (Haines, Imeson & Meade, 1980) and smoking is over represented among individuals with depression (Chang & Chiang, 2009). Flensborg-Madsen et al. (2011) suggest depressed people are likely to start smoking given it is known to produce an elevation in mood and sense of well-being, and that depressed people may self-medicate with cigarettes. Longitudinal studies have supported the nature of this positive relationship, in which the presence of depression increased the risk of smoking progression (Fergusson, Horwood & Swain-Campbell, 2003).

Alcohol is also known to produce an elevation in mood and sense of well-being, and there is extensive evidence linking mental health problems with alcohol use (Holt et al., 2012). Having a mental illness, including depression, in addition to a substance use problem is associated with higher risks of suicide, functional impairment and adverse outcomes for clinical and health care use (Hickie, Koschera, Davenport, Naismith & Scott, 2001; Munro & Edward, 2008; Sullivan, Fiellen, & O'Connor, 2005).

According to Riemann et al. (2001) more than 90% of depressed clients complain about impairments of sleep quality. Typically, depressed clients suffer from difficulties in falling asleep, frequent nocturnal awakenings, and early morning awakening. According to Vandeputte and Weerd (2003) in general, 25% of clients who present at a sleep disorder clinic describe themselves as currently depressed and 60% report symptoms consistent with an episode of major depression within the last five years.

A recent Australian national survey of people living with a psychotic illness found that only 3% of participants reported a moderate or high physical activity level in the past week compared to 28% in the general population. Further, 58% of men and 39% of women reported a history of alcohol misuse or dependence compared to 35% and 14% respectively in the general population (DoHA, 2011). Approximately half had one serve or less of fruit or vegetables per day respectively, and 71% and 58% of men and women were current smokers compared to rates of 28% and 23% in the general population (DoHA, 2011).

It is clear that there is a direct relationship between a diagnosis of depression and poorer lifestyle choices and health behaviours, but as discussed, the direction of this relationship is unclear. Despite the clear links between physical health status and mental illness, there a few studies which have examined these factors in relation to the severity of the symptoms being experienced, and in particular, whether the relationship persists in populations who are experiencing some symptomatology, but who do not meet the threshold for a clinical diagnosis. The studies examined thus far in this paper examine either clinical
populations with a diagnosed mental illness, or the general population compared to a clinical population. But what about the languisher? What about those individuals who are experiencing low levels of psychological well-being, but only moderate levels of mental illness? Individuals who do not meet the threshold for diagnosis, but are at risk of their symptoms worsening. In order to begin to fully comprehend the relationship between disorders such as depression and health behaviours, we need to understand the interaction between symptoms and behaviours prior to a diagnosis of a mental illness. As such, this study aims to examine the relationship between severity of depressive symptomatology and health behaviour choices. It is predicted that as the severity of depressive symptoms increase, positive health behaviours will decrease. That is, those with severe depressive symptomatology will exhibit significantly poorer health behaviours that those with moderate or no-mild symptoms of depression. Similarly, those exhibiting moderate levels of depressive symptoms will exhibit significantly poorer health behaviours than those with low-no symptoms.

**Method**

**Participants**

The sample comprised 1935 Australian participants aged between 18 and 91 years, recruited as part of the Australian Health and Social Science (AHSS) panel survey. The AHSS panel comprises a total of 4,352 potential participants, representing a response rate of 44.5% for this study. The mean age of participants was 55 years ($SD = 12.83$) and the highest proportion (29%) of participants were aged 55 to 64 ($n = 539$). Just over half (55%, $n = 1026$) of the sample were female. Most of the participants in the sample were married or in a de facto relationship (76%, $n = 1475$). Participant education levels varied, with approximately half of respondents having a tertiary level education (52%, $n = 961$).

When depressive symptomatology was examined, the mean level of depressive symptoms was 9.52 ($SD = 8.97$) and 81% ($n = 1549$) of participants reported no or very mild symptom levels. Moderate symptoms were reported by 13% ($n = 258$) while 6% ($n = 113$) of participants reported symptoms consistent with a diagnosis of major depression.

**Materials**

Depressive symptomatology was measured using The Centre for Epidemiological Studies – Depression Scale (CES-D) (Radloff, 1977). The CES-D is a 20 item scale measuring symptom severity which asks participants to rate the frequency with which they have experienced each symptom during the past week. Responses are made on a 4 point scale
ranging from 0 = rarely or none of the time; to 3 = most or all of the time. Total possible scores range from 0 to 60. Participants who score between 0 and 15 are classified as having no – mild depressive symptomatology; participants who score 16-26 are classified as having moderate depressive symptoms; and participants who score 27 or above are classified as illustrating symptoms consistent with Major Depressive Disorder (Geisser, Roth & Robinson, 1997; Radloff, 1977).

The measurement of health behaviours was modeled on the approach reported by Harrington et al. (2009). An individual health behavior score was calculated for each participant. Each health behaviour was scored dichotomously based on achieving recommendations including;

- Being physically active,
- Being a non-smoker,
- Being a low-moderate drinker,
- Having good sleep hygiene;
- Having sufficient fruit and vegetable intake

1 = achieving health behaviour recommendation and 0 = not achieving health behaviour recommendation. Participants could achieve a health behaviour composite score between 0 and 5, with 0 indicating failure to achieve any of the health behavior recommendations and 5 indicating achievement of all health behavior recommendations.

Alcohol consumption was measured using the Alcohol Use Disorder Identification Test—Consumption (AUDIT-C; Bradley, DeBenedetti, Volk, Williams, Frank & Kivlahan, 2007). The AUDIT-C has been validated as a brief alcohol screening questionnaire for the spectrum of alcohol misuse including risky drinking and active alcohol use disorders. The AUDIT-C consists of three questions which ask about frequency of alcohol consumption, typical quantity of alcohol consumption, and the frequency of consuming 6 or more alcoholic drinks on any one occasion in the past year. Each response is scored 0 to 4, with total AUDIT-C scores ranging from 0 to 12 points. Participants who achieved AUDIT-C scores of 0 were past year nondrinkers; participants who achieved scores of 1–4 reported generally low-level drinking; participants who achieved scores of 5–8 screened positive for mild-to-moderate alcohol misuse (having 3 or more drinks most days or 6 or more drinks on some days in the past year); and participants who achieved AUDIT-C scores of 9 or more reported severe alcohol misuse (having 5 or more drinks most days) (Harris, Bradley, Bowe,
Henderson & Moos, 2010). Participants with AUDIT-C scores between 0-4 were considered to engage in healthy alcohol behaviours. Participants were classified as either engaging (1) or not engaging (0) healthy alcohol consumption behaviours.

Physical Activity was measured using the Active Australia Survey (Brown, Bauman, Chey, Trost & Mummery, 2004). This nine-item instrument investigates current levels of moderate and vigorous physical activity. A healthy behaviour in relation to physical activity is considered to be 150 minutes of moderate or vigorous physical activity over a one week period (DoHA, 1999). Participants were classified as either meeting (1) or not meeting (0) the health behaviour recommendation of 150mins/week moderate or vigorous physical activity.

Smoking status was measured by asking participants if they were a current smoker, ex-smoker or non-smoker. Participants were classified as either non-smoker (0) or current/ex-smoker (1).

Typical fruit and vegetable consumption was measured by asking participants to report the number of serves of fruit and vegetables they consume on a typical day. Participants were provided with an example of what constituted one serve of each. (Participants were classified as either meeting (1) or not meeting (0) health behaviour recommendations of ≥2 serves of fruit and ≥5 serves of vegetables per day (Pollard, Miller, Woodman, Meng & Binns, 2009).

Sleep hygiene was measured using the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman & Kupfer, 1989) which is a widely used 19-item self-report questionnaire that measures sleep disturbances. According to the scoring guidelines provided by Buysse et al. (1989), the 19 items are analysed to yield 7 sleep components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. The seven component scores are then summed to yield a global PSQI score, which ranges from 0 to 21. Higher scores indicate poorer sleep quality. Based on the recommendations (Buysse et al., 1989), good sleep hygiene is indicated by a score of 5 or less on the PSQI and participants were classified as either meeting (1) or not meeting (0) health behaviour recommendations for good sleep hygiene (PSQI score ≤5).

Procedure

The national panel of participants (N=4352), were recruited via computer assisted telephone interviewing (CATI), and included a random sample of Australian adults living in each
Australian state and territory. The online survey was using SSI Web V7 (Sawtooth Software). Each participant received an email containing survey information and a unique password (enabling participants to re-start the survey). Ethical approval was obtained from the Human Research Ethics Committee at an Australian university. Participants provided demographic characteristics and completed the questionnaire within the AHSS.

Results

Correlations between overall depressive symptomatology and each continuous variable were examined. The results indicated that there was a very small, but significant negative correlation between severity of depressive symptoms and physical activity ($r = -.12, p<.001$) and a strong, positive relationship between depressive symptoms and sleep hygiene ($r = .54, p<.001$) indicating as poor sleep increased so did symptoms of depression. There was no significant relationship between alcohol consumption and depressive symptoms. The correlation between depressive symptomatology and the health behaviours composite was also examined, and the results indicated a significant moderate, negative relationship ($r = -.35, p<.01$) indicating as depressive symptoms increased, the occurrence of health behaviours in accordance with recommended guidelines, decreased.

Differences in health behaviours were examined in relation to each category of depression identified (mild, moderate, major). The proportions (for dichotomous variables) and means and standard deviations (for continuous variables) for each health behaviour are shown in Table 1. The data indicates a consistent pattern of poorer health behaviours for those in the major depression category compared to those in the moderate and low categories. Similarly, those with moderate symptoms showed poorer health behaviours that those in the low symptom category, with the exception of alcohol consumption. Participants in the moderate category had lower mean consumption than both the low symptom group and the major depression group. Table 1 also shows the mean health composite score for each group and, consistent with observations of each individual variable, indicates poorer health behaviours as depressive symptoms increase.

Table 1: Health behaviour scores across each depressive symptom category.

<table>
<thead>
<tr>
<th>Depression Category/ Health behaviour</th>
<th>No-low symptoms</th>
<th>Moderate symptoms</th>
<th>Major depression</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking Status (Yes)</td>
<td>6.5% ($n=98$)</td>
<td>11.2% ($n=28$)</td>
<td>14.5% ($n=16$)</td>
<td>7.8% ($n=142$)</td>
</tr>
</tbody>
</table>

53
Dietary habits (not met) 90% (n=1400) 93.4% (n=241) 96% (n=108) 91.1% (n=1749)
Alcohol Consumption 3.29 (2.39) 3.13 (2.76) 3.53 (3.02) 3.27 (2.48)
Physical Activity 31.39 (32.41) 28.83 (36.48) 19.75 (25.84) 30.36 (32.75)
Sleep 4.86 (2.95) 8.23 (3.55) 9.68 (4.11) 5.59 (3.47)
Health Composite 3.11 (0.96) 2.60 (0.89) 2.21 (0.86) 2.99 (0.98)

In order to examine the differences between each of the symptom categories, a series of chi-square tests (for dichotomous variables) and one-way ANOVAs (for continuous variables) were conducted. The chi-square analyses indicated that there was a significant difference in the proportions of smokers in each symptom category $\chi^2(2, N = 1858) = 14.36, p = .001$. However, there were no significant differences found between the proportions of individuals in each symptom category and consumption of fruits and vegetables (dietary habits) $\chi^2(2, N = 1920) = 5.48, p = 0.07$.

One-way ANOVAs indicated that there were significant differences in physical activity [$F(2, 1917) = 7.03, p <.001$] and sleep [$F(2, 1815) = 220.66, p <.001$] according to symptom category. However, there were no differences in alcohol consumption. Tukey HSD post-hoc comparisons revealed that the low depression group participated in significantly more physical activity than the major depression group ($p<.001$); but there were no significant differences in physical activity between the moderate group and the low group, or the major depression group. The post hoc tests indicated significant increases in sleep problems across each symptom category with the low symptom category having significantly less problems than the moderate category which showed significantly less problems than the major depression category. Tukey’s test was considered appropriate in this instance due to its sensitivity within unequal group sizes (Kramer & Howitt, 2004).

A one-way ANOVA was conducted to examine differences in the health composite score across the symptom categories. The results indicated there were significant differences in health composite scores according to severity of depressive symptoms [$F(2, 1799) = 68.46, p <.001$]. Due to a violation of the assumption of normality, a Kruskal-Wallis test was conducted to examine if the assumption violation was having an effect. The Kruskal-Wallis returned the same result as the ANOVA ($p<.001$). Post-hoc comparisons using Tukey’s HSD revealed significant differences in health behaviour composite scores.
across all the symptom categories. Those in the low depressive symptom category had significantly higher health composite scores that the moderate category, which had significantly higher scores than the major depression category.

Discussion

This study examined the effect of depressive symptomatology on different health behaviours in isolation, followed by a composite health measure which indicated the extent to which each individual met government recommendations for different types of health related activities. It was predicted that there would be significant differences in health behaviours depending upon the level of depressive symptomatology participants reported. This hypothesis was supported. The pattern across the individual health behaviour variables was generally consistent, with those with higher symptoms associated with depression showing poorer health behaviours, and accordingly this pattern was observed in the composite health behaviour scores. However, there were two variables which did not show this pattern, alcohol consumption and dietary habits.

While the general pattern of results were not unexpected, and are consistent with the literature regarding the relationships between physical and psychological health, it is important to consider the importance of acknowledging the moderate depression group who had a higher level of depressive symptoms, and lower health behaviour scores, but whom do not meet the threshold for a diagnosis of clinical depression. The results suggest that these individuals are more likely to be smokers, engage in less physical activity, and have poorer sleep patterns than individuals with low depressive symptoms, although they experience less of these than those with major depression. This indicates that they are an important group to target when considering prevention of depression, and indeed mental illness generally. The results suggest that the severity of an individual’s depressive symptoms have some impact on the frequency with which they engage in adverse health behaviours, as well as the likelihood on engagement in protective behaviours.

The finding with regard to alcohol consumption was surprising, given previous research which indicates a relationship between depression and alcohol consumption. It is interesting to note that the mean score for all symptom groups fell into the low level drinking category. It is possible that rather than alcohol, participants were using some form of illicit substance, however, given the low scores across the board, it may also be a reflection of a social desirability bias. Of course, it is also possible that participants who responded did indeed regularly consume alcohol at low, healthy levels.
In examining the pattern of dietary habits, the same trend emerges as with the other health behaviours, that is there appears to be a decrease in healthy levels of fruit and vegetable consumption as severity of depression increases. The non-significant result is this instance appears to be related to the dietary patterns of Australians generally. In this study 91% of participants overall did not meet the recommended daily intake of fruits and vegetables. However there is a clear increase in these proportions across the depressive symptom categories, with 96% of participants in the major depression category not meeting these recommendations. As such, when only 9% of the population is meeting a recommendation, it is an important factor to consider. The results showed that only 10% of individuals with low symptoms met the dietary recommendations, but this decreased to 6.5% with moderate depression, and to 4% with major depression, thus showing the same pattern of results as the other health behaviour variables.

Clinical Implications

The results from this study encourage practitioners to pay attention to clients presenting with moderate symptoms of depression, and not focus solely on treatment and intervention for those presenting with severe depressive symptomatology. It illustrates the possible preventative value in early recognition of symptoms which could progress to a clinical diagnosis. The findings also speak to the importance of taking a holistic approach to the treatment of depression and depressive symptomatology, and the monitoring of lifestyle characteristics alongside an individual's psychological health. Given the bi-directional nature of the relationship between physical and psychological health, it is likely that interventions aimed at promoting positive health behaviours (e.g. quitting smoking, increasing exercise, better dietary habits) could have positive outcomes for mental health. Similarly, in a therapeutic setting, recommendations targeting physical health is likely to pay dividends to psychological health. Suls and Rothman (2004) recommend a multi-disciplinary team approach to assessment. The findings of the present study are supportive of this approach, demonstrating that poor health behaviours are common amongst those with mild and severe depression. This suggests that multi-disciplinary teams including GP’s, nutritionists and exercise physiologists should work collaboratively to improve the psychological and physical health of individuals suffering from or at risk of developing depression.

Limitations

The cross-sectional nature of the data inhibits causal inferences on the associations between depression and health behaviours, furthermore, the study did not assess whether individuals had actually received a diagnosis of depression, or indeed any other psychological disorder. As such, it is possible that, while meeting the symptom level for a
diagnosis of clinical depression, those individuals who met this threshold may have been suffering some other form of mental ill-health. Similarly, this study did not examine diagnoses of physical conditions, which, as illustrated by Scott et al (2012) is an important variable to consider when examining relationships between physical and psychological health. Future studies which investigate these relationships would be encouraged to explore psychological and physical illness co-morbidity.

Future studies may wish to examine the influence that depression has on the use of substances beyond alcohol, given this study produced insignificant results between depression and alcohol consumption. Substances such as cannabis/hallucinogens, opioids, stimulants, benzodiazepines, inhalants/solvents; have been shown to commonly be used by individuals suffering from a mental illness (DoHA, 2008).

**Conclusion**

The strength of this study is in the recognition of the importance of assessing health behaviours and that any interventions or preventative mechanisms should target both physical and depressive symptoms, which may lead to a protective effect for some clients. Further it emphasises the importance of holistic approaches in both treatment of, and attempts to prevent the escalation of depressive symptoms.

This study was conducted to gain an understanding of the relationships between depressive symptoms and health behaviours. A significant association between increasing depression severity and decreasing health behaviours was identified, supporting the need for a multidisciplinary approach to assessment, diagnosis, treatment, and prevention. Results from this study indicate depression, whether the symptoms are mild or severe, influence health behaviours and these represent a target for both intervention, and a point at which symptoms could be targeted to prevent the development of depression at the clinical level.

**References**


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