

Neuropsychopathology and procrastination

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ABSTRACT

Introduction: Procrastination is a ubiquitous, multifaceted and problematic phenomenon. This paper will address the best scientific understanding published on this subject, although it is limited and of poor quality. **Method:** For this original revision study, we have examined various relevant bibliometric databases in a non-systematic way and with no claim to being comprehensive. The methodology used in much of the research consulted is quite deficient. Our objective has been to provide synthetic results from primary sources and have therefore avoided the most speculative ones. **Results:** With regard to the neuropsychopathological clinical features of procrastination, internalizing this behaviour is related to neuroticism, and externalizing it is linked to impulsivity. Procrastination increases with negative affectivity, and it often occurs in certain mental disorders, where it tends to constitute a permanent behaviour. Few studies have researched the neural correlations of procrastination. It can be voluntary and also an indirect consequence of perfectionist traits of personality, among others. In general, improving one's ability to regulate emotions might be very effective in reducing procrastinating behaviour. In relation to bedtime, its continued postponement seems to also be tied to personality traits. **Conclusions:** The author proposes the hypothesis that any specific intervention, whether medical or not, that improves awareness of one's own passive tendency to procrastinate will favour its reduction. However, if the intention is to influence somebody's mental health specifically, then the intervention should be conducted exclusively or preferably by properly qualified physicians.

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INTRODUCTION

Procrastination is a ubiquitous, multifaceted and problematic phenomenon. Procrastinating consists of avoiding, delaying, substituting or postponing activities that are generally important for the subject, which demand specific physical or attentional and cognitive resources. It may be adaptive, but usually it is not. It often occurs before starting or finishing certain tasks and leads to inefficient time management and usually also to subjective discomfort.

If it happens habitually and voluntarily, procrastination will be rather irrational and involve cognitive, affective and motivational difficulties in goal management. Therefore, repeated procrastination will usually lead to problems or even failure in one's self-regulation of behaviour, both externally and of one's own thoughts, emotions and attention, which is so important in the field of mental health. Furthermore, people with low cognitive self-regulation will often engage in maladaptive and risky behaviours, despite their consequences.

There are many different classifications and typologies proposed to interpret procrastination behaviours, which will not be dealt with in this contribution. Most explanatory hypotheses are rather speculative, purely psychological and linked to the type of activity that is usually postponed. So far, research has mainly focused on samples of students and has discussed the definition, classification, antecedents and consequences of procrastinating⁽¹⁾.

This contribution, which is an original, technically specialised review, will address the best published neuro-psychological scientific knowledge on the subject. However, current understanding of procrastination based on adequate research is very limited and of rather low quality. Procrastination, besides voluntarily wanted, can be passive as a corollary of perfectionist, relatively stable personality traits, amongst others. For the sake of brevity, unless otherwise stated, we will henceforth refer to passive procrastination.

MATERIAL AND METHOD

These bibliographic databases have been reviewed non-systematically as sources of information: 1. PUBMED, US – National Library of Medicine, National Institute of Health (NLM); 2. Scientific Literature (SCILIT Indexing); 3. American Psychological Association (PSYCINFO JOURNAL); and 4. ÍNDICES CSIC, Spanish Ministry for Science, Innovation and Universities, Spain, UE. These descriptors or indexing terms have been used primarily, but not exclusively: “procrastination”, “procrastinate” and “psychopathology”. Likewise in Spanish: “procrastinación”, “procrastinar” and “psicopatología”.

In those directories and in the primary documents, there is a great deal of relevant information, but in general they are not especially qualified contributions, or not very qualified at all. Up to May 2022, we have found: n= 5037 related references in Scilit, n= 3942 in PubMed, n= 1338 in APA PsycNet and n= 12 in ÍndicesCsic. The vast majority are psychologistic contributions.

In many cases, contributions on the issue are based on prior speculation, are only exploratory, use inappropriately small samples or non-representative subsets. They also generally lack control groups, focus on a very specific occupational activity, obtain poor and inconclusive results or rely exclusively on self-reporting. The methodology is often poor.

Furthermore, in no case has the so-called “Hawthorne effect” been explicitly considered in the title⁽²⁾, an effect that is often regarded as a common methodological artefact in much psychological research. A total of n= 43 documents have been selected for this article. The research addresses a topical, professionally relevant issue. The scientific quality of the selected material was necessarily limited due to its heterogeneous nature, but the result was intended to be original, synthetic and contrasted.

RESULTS AND DISCUSSION

Clinical neuro-psychopathology and procrastination

The association between procrastinating and psychically internalising has been indirectly and conditionally explained by the “fear of failure” as well as the “neuroticism” factor described by Hans Eysenck. This factor, as is well known, implies both instability and emotional insecurity, according to the Big Five personality factors theory⁽³⁾. However, neurotic personality does not determine procrastination, even though both elements interact⁽⁴⁾.

The association with behaviour externalisation, on the other hand, has been mainly related to impulsivity⁽⁵⁾. Impulsivity involves reduced control of executive functioning, especially in the control of inhibition. The “responsibility” factor can be seen as the way in which one’s impulses are directed and regulated. Sometimes procrastinating will just be a form of chronic avoidance behaviour. Procrastinatory tendencies appear to increase with negative affectivity, suggesting impaired mechanisms of emotional regulation, attention and error processing^(6,7). It has been specifically suggested that impaired error and punishment learning may be an important mechanism underlying poor self-regulation in a variety of disorders^(8,9).

Cognitive functions, which reside in the cerebral cortex, have limited influence on subcortical areas. Although not in itself a clinical condition, procrastination occurs very often in morbid states of anxiety and depression. And also in other states, such as “attention deficit hyperactivity disorder”, within the current neurodevelopmental disorders in the International Classification of Diseases (ICD-11)⁽¹⁰⁾. Anxiety as a personality trait is related to greater procrastination, as the person shows poorer cognitive self-control⁽¹¹⁾.

The disorders mentioned in the preceding paragraph entail specific and distinct patterns of action or non-action, as well as persistent mismanagement of

time, common to all. In symptomatic mental cases that are appropriately typified as pathological, procrastination will tend to become a stable mode of behaviour. Specific biomarkers for persistent procrastination have even been proposed⁽¹²⁾. However, as a fundamental personal cognitive phenomenon, a lack of insight into whether one is suffering from certain mental disorders is a common occurrence⁽¹³⁾. This will affect, where appropriate, the tendency to procrastinate that is usually associated with the particular disorder.

Resting-state functional connectivity between the amygdalae of the cerebral temporal lobes and the dorsal anterior cingulate cortex has been significantly linked to actions related to decisions taken. The dorsal part of the cingulate cortex is connected to the prefrontal and parietal cortex. In a major German research study, the stronger the functional connectivity, the higher the correlation with increased planned actions⁽¹⁴⁾, in contrast to procrastination.

Few studies have investigated the neural correlates of procrastination. It seems to be demonstrated, according to the research just mentioned, that the activities derived from the appropriate prior decisions are based on the anatomical architecture and functional network of the amygdala. Habitual procrastinators will have a larger amygdala, as well as poorer and deficient connections with the cingulate cortex. Consequently, these subjects manifest difficulties in blocking emotions and distractions.

Decision-making must also be considered as comprising a set of “pre-reflective” processes associated with affect and relationships with others, along with cognitive and rational processes⁽¹⁵⁾. Cognitive deficits in multiple neuropsychopathological disorders have been associated with alterations in the balance of synaptic excitation and inhibition in circuits of the cerebral cortex. Under a high arousal/inhibition ratio, decision-making will be impulsive, overestimating early evidence and underestimating late evidence. With the aforementioned ratio reduced, decision-making will be indecisive⁽¹⁶⁾.

In general, the neurobiological mechanisms underlying social adaptation are not yet well understood, although the key role of serotonin has been highlighted and it has been suggested that it may facilitate social learning⁽¹⁷⁾. Serotonin enhances mood and calm, while noradrenaline mobilises the body in the face of stress⁽¹⁸⁾.

Chronic procrastinators prefer short-term activities. “Impulse control disorders” and “Disruptive and dissocial behaviour disorders” in the ICD-11 are similar to their homonyms in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR), both 2022 nosographies⁽¹⁹⁾. Both include unique conditions that manifest with severely impaired and problematic self-control of behaviour and emotional regulation. We know that impulsivity is closely related to procrastination at behavioural, genetic and neural levels, and is also related to motivation.

Although adequate studies are lacking, the psychopathological conditions mentioned above might make subjects particularly prone to procrastinating as a habit. In order to reduce unwanted procrastination, the first feasible psychological interventions have been developed with apparently acceptable results. Such interventions are based on behavioural and motivational strategies, which need not be specifically health activities⁽²⁰⁾. There are the habitual psychotherapies, properly speaking, which are expected to adequately influence the underlying mood or affective state. Currently, cognitive behavioural therapy seems to achieve the best results in favourable intervention on procrastination, even if they are minor and moderate^(21,22).

Procrastinating in the daily performance of activities

Each individual has their own procedural schemas that define their cognitive characteristics. Procrastinating a task often happens more in everyday work or student life. Procrastination at work is negatively related to performance, which emphasises the importance of adequate prior

engagement between employee and employer⁽²³⁾. Procrastination in the work or student environment will usually lead to difficulty or inability to achieve goals of interest related to the activity.

Active procrastination involves the ability to intentionally delay tasks in order to perform them more effectively and can therefore be an adaptive and productive coping style⁽²⁴⁾. In contrast, see what was said about “avoidant” subjects in the previous subsection. Likewise, active procrastination will be characteristic of people with a certain mental rigidity, excessive self-demand, self-criticism and self-discipline.

Such factors may even lead to clinically significant and maladaptive, i.e. psychopathological, distress. It has also been considered on a more somatic level that, as a sign, procrastination is a vulnerability factor for poor adjustment and management of hypertensive disease and cardiovascular risk⁽²⁵⁾.

Perfectionism and the experience of stress are related. Furthermore, maladaptive procrastination appears to be associated with maladaptive perfectionism⁽²⁶⁾. Indeed, preoccupation with mistakes and self-doubt about what to do, characteristic of perfectionists, have been shown to correlate positively with procrastination⁽²⁷⁾.

Metacognition, understood as the act and effect of knowing, as well as perfectionism, correlates with anxiety and depression in clinical categories. Metacognitive awareness is the ability to realise that one is experiencing a particular experience. Metacognitive beliefs predict appropriate and inappropriate perseverance behaviours, the former being linked to resilience and opposed to procrastination behaviours.

Metacognition or metacognitive awareness, closely related to the concept of “theory of mind”, allows one to anticipate one’s own and others’ behaviour by perceiving and being aware of the emotions, attitudes and feelings of those involved⁽²⁸⁾. We know that there are correlations between perceptual metacognitive ability and the

structure and functioning of the lateral prefrontal cortex⁽²⁹⁾.

Procrastinating seems more likely if it is difficult for individuals to associate the postponed or substituted task with an outcome that is highly valued, or when individuals are faced with tasks to which they are averse. This is accompanied by reduced hippocampal-striatal interactions, objectified during the performance of these activities⁽³⁰⁾.

Pre-procrastination anxiety has been positively correlated with the variability of the dynamic functional connectivity of hippocampal pathways with the prefrontal cortex⁽³¹⁾. It has been suggested that procrastination could be predicted by the grey matter volume of the orbital frontal cortex and medial frontal gyrus, which are key regions of self-control and emotion regulation⁽³²⁾.

Specific mention should be made of the characteristic procrastination of people with the subjective phenomenon colloquially called “impostor phenomenon”, sometimes referred to as “impostor syndrome”. The phenomenon consists of the experience of assuming that one is an intellectual or professional fraud. It reflects a negative, critical self-concept, and negatively affects the individuals who experience it. It is often considered a personality trait, rather than a state, and is associated with perfectionism, insecurity and fear of failure or even success. Certain authors stress the related importance particularly of the social context⁽³³⁾.

On the other hand, mental self-control is given anatomically and physiologically by: a) the relationship of the left dorsolateral prefrontal cortex with the posterior cingulate gyrus; and b) by motivation, linked to the relationship of the parahippocampal gyrus with the putamen, and of the insula with the inferior parietal lobe. Both could represent the two neural pathways underlying the markedly inverse impact of scrupulousness on procrastination, and both are positively associated with the level of awareness⁽³⁴⁾.

Improving general skills to regulate emotions seems to be effective in reducing subsequent procrastinating behaviour⁽³⁵⁾. There are also favourable non-health interventions based on methods that implement so-called “full awareness” or “mindfulness”^(36,37) and certain other quite similar practices such as yoga. Indeed, full awareness enhances prefrontal activation and its control over the amygdala⁽³⁸⁾. Similarly, the right temporo-parietal junction may be involved in a neural interaction in which perceptual awareness favours attentional control⁽³⁹⁾.

Note that the heuristics or methodological sets are many and varied, as well as psychological strategies and actions of all kinds, which are reported to have favourable results in reducing procrastination. Consequently, it is logical for the author to propose here the hypothesis that any ad hoc intervention will lead to the subject’s awareness of their procrastinatory tendency. It will be the raising of awareness and the consequent decisive purpose, rather than the interventional technique used, that will be responsible for the intended favourable outcome.

Procrastinating sleep at night

Good sleep is necessary for effective daytime cognitive and emotional processing. A recent, widespread increase in the prevalence of bedtime procrastination, either by delaying bedtime or when wanting to sleep while already in bed, is being observed.

Such an attitude, which is generating some new clinical and non-clinical interest, is conducive to what is colloquially known as “bedtime revenge procrastination”, or the conscious act of trying to delay sleep without external motivation. One of the significant determinants of sleep deprivation is procrastination at bedtime.

Delayed sleep behaviour is especially observed when there is limited time for relaxation following the experience of moderately high daily stress. A voluntary decision is then made to extend relaxation time to compensate, in what might be

called a “late night to offset daytime stress”. It has been suggested, however, that sleep deprivation may have some dysfunctional effect on adaptive emotion regulation⁽⁴⁰⁾.

Instruments exist for assessing sleep procrastination. Some have been developed that could be valid and reliable for application in the Spanish-speaking population⁽⁴¹⁾. Procrastinating sleep has been related to insufficient sleep⁽⁴²⁾ and to anxious character traits that could generate some deficit in cognitive self-control⁽¹¹⁾. It is also associated with excessive use of certain social technologies, or in relation to their content and context.

Personality characteristics probably play an important role in night-time sleep procrastination⁽⁴³⁾. Numerous studies also negatively associate sleep procrastination with sleep quality and basal mood. On the other hand, the “BED-PRO” study describes the first psychological intervention aimed at improving inappropriate procrastination at bedtime, as already introduced in the first subsection of this contribution⁽²⁰⁾.

CONCLUSIONS

Procrastination is a ubiquitous, multifaceted, rather irrational and problematic phenomenon that affects cognitive-emotional self-regulation. In relation to the effects of its internalisation, it has

been linked to emotional instability and insecurity. In terms of its externalisation, it has mainly been linked with impulsivity.

Procrastinatory tendencies are likely to increase with negative affectivity, which usually entails poor time management. Habitual procrastinators will have difficulties blocking emotions and distractions linked to their specific neuroanatomy and neurophysiology. As a result, they will have difficulty blocking out emotions and distractions.

Certain psychopathologies can make individuals particularly susceptible to the habit of procrastinating. Personality characteristics probably also play an important role in night-time sleep procrastination and early psychological interventions to deal with this have already been developed. Meanwhile, the emerging neuroscience is expected to be transformative in this area for mental health specialties.

Interventions on procrastination in specific relation to mental pathologies should only be health-related and carried out by medical psychiatric specialists, or by appropriately qualified clinical psychologists. However, in the absence of psychopathology, the author hypothesises that any intervention, whether or not it is health-related, that improves awareness of one’s tendency to procrastinate will help to alleviate procrastination, whether the habitual procrastination is intentional or not.

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