

Impacts of plastic and other hazards on the healing properties of the Belgian coast

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Background/Aims

Natural coastal environments are good for healing people's mental and physical health through the replenishment of depleted cognitive resources. These cognitive resources are necessary to deal with everyday challenges and demands, and form the basis to protect ourselves from mental and even physical illness. However, coastal environments have usually been researched as being natural blue spaces containing only natural views, while coasts are actually spatially heterogeneous mosaics of predominantly urban, green, blue or mixed landscapes, especially in Belgium. As such, the degree to which cognitive resources are replenished and so-called 'restoration' occurs can differ between diverse coastal landscapes. Therefore, the primary aim of this study is to compare the perceived restoration of ten coastal landscapes in Belgium (i.e. beach, dune, nature park, pier, dike, town, recreational harbour, docks, historical site and inland green space). Besides these landscape-specific quantifications, we also assessed the impacts of anthropogenic disturbances (i.e. litter, vehicles and benches) on the restoration potential.

Methods

Ninety-four pictures were taken along the Belgian coast to represent combinations of coastal environments and anthropogenic disturbances. Participants (students aged 18-30y, 16% males) rated each picture on a derivative of the perceived restorativeness scale, scaled from 0 to 10. In addition, objective measures of cognitive and physiological restoration were quantified through eye-tracking and indices of sympathetic and parasympathetic nervous system activation (i.e. electrocardiogram and skin conductance) and quantification of picture characteristics in terms of colour values (RGB), fractal dimension and pixels covered by natural and urban elements allows to precisely investigate these potential explaining factors. Linear mixed modelling standardized for age, sex, socio-economic status and other personal and demographic covariates.

Results

Preliminary results revealed that inland green space (ref), salt marshes, beaches and dunes without litter or vehicles scored best on all five restoration scores, while the urbanized environments dike, town, harbours and historical places scored all equally worse ($p < 0.05$, piers were scored moderately). Pictures with litter or vehicles were rated on average $17.2\% \pm 1.8\%$ and $14.1\% \pm 2.7\%$ lower than similar pictures without litter or vehicles, respectively (the presence or absence of benches did not differ). The negative effect of litter and vehicles on the restoration potential was stronger in natural environments (e.g. on beach $25.5\% \pm 7.4\%$ decrease due to plastic) compared to urbanized environments (e.g. on dike $10.68\% \pm 7.4\%$ decrease due to plastic). Differences in eye movements, indices of heart rate variability and skin conductance, and picture characteristics are yet to be statistically analysed.

Conclusions

Our results support the hypothesis that the perceived restoration differs within coastal landscapes. Natural undisturbed sceneries were perceived as more restorative than urban and disturbed natural

sceneries with litter or vehicles, supplementing earlier research. Hence, researchers that evaluate people's coastal experiences should consider the inter-landscape variability in perceived restoration. Coastal residents, visitors and policy makers can make use of this knowledge to optimize people's coastal experiences for the prevention of mental and physical health burdens, e.g. through minimizing litter.

Keywords: Coastal environments; Plastic; Blue space; Restoration capacity; Attention restoration theory