Burnout: Mitigating the Risk Through Optimal Water Intake?

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INTRODUCTION

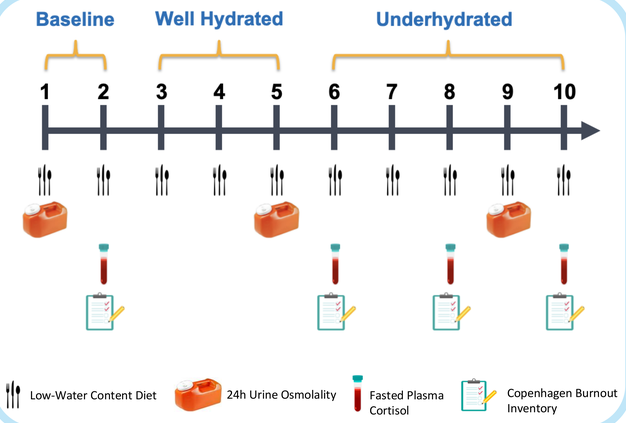
Although the importance of hydration for physical health and wellness is well established, its role in well-being remains less understood. Burnout is characterized by often concomitant and varying degrees of profound mental, emotional, and physical exhaustion resulting from prolonged or excessive work-related stress. Among healthy young adults in the United States, burnout prevalence is high, with many studies reporting rates exceeding 50%. Left unaddressed, burnout can have lasting consequences for well-being, reduce productivity, and increase the risk of chronic clinical conditions, including depression, cardiovascular disease, and impaired immune function. Beyond the impact on individuals, aptly addressing mental well-being and physical health widely within a community can lead to greater overall productivity, lower absenteeism, improved job satisfaction, fewer operational disruptions, reduced healthcare costs, and increased consumer demand (whereas medical expenses can reduce disposable income).

Despite the inherent benefits to regular adequate hydration, fewer than half of young adults meet the daily water intake recommendations established by the National Academies of Medicine. And notably, individuals who fail to meet these recommendations exhibit approximately 50% higher circulating cortisol concentrations than those who achieve adequate hydration. Because inadequate daily hydration elicits a measurable physiological stress response, as indicated by elevated cortisol, investigating the relationships among hydration status, perceived burnout, and plasma cortisol is warranted. Clarifying these associations may help inform individual and public health strategies that incorporate adequate hydration as a simple, accessible component of mental wellness and burnout prevention.

PURPOSE

Whereas hydration status has been linked to mood, cognition, and fatigue, we investigated whether habitual hydration status and short-term alterations in water intake are associated with a stress-related biomarker and subjective burnout among healthy young adults.

METHODS



Participants:

- 22(4) years old
- Women (n=27) and men (n=14)
- Healthy, non-tobacco users, not taking any psychoactive medications

Intervention Protocol:

- Participants replicated a low-water content diet throughout the study and refrained from exercise (2d before and during), supplement (7d before and during) and alcohol (2d before and during) intake
- Participants followed a hydration intervention as follows:
  - **Phase 1: (Days 1&2) Baseline, Habitual hydration**
  - **Phase 2: (Days 3-5) Well hydrated (35ml·kg^{-1}·d^{-1})**
  - **Phase 3: (Days 6-10) Underhydrated (20ml·kg^{-1}·d^{-1})**

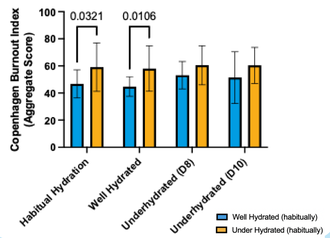
Statistics:

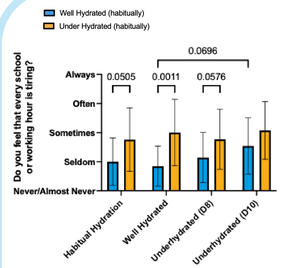
- Data were dichotomized by distinct baseline hydration status using reported 24h urine osmolality thresholds
  - <500mOsm·kg^{-1}=well hydrated (women=9, men=5)
  - >800mOsm·kg^{-1}=underhydrated (women=18, men=9)
- Change from baseline measures across groupings were determined by mixed effects analyses with Tukey post hoc tests (alpha = 0.05)
- Spearman or Pearson correlation analysis was performed depending on the normality of the data in each measure (alpha = 0.05)

RESULTS

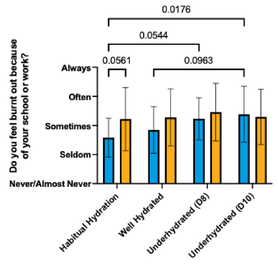
The largest and most consistent differences were noted with habitual hydration practices, suggesting the importance of chronic water intake, although short term changes in water intake through our intervention appear to have an influence on burnout metrics as well.

Primarily, those who were habitually well hydrated expressed less burnout while they remained well hydrated.

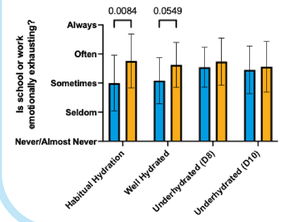




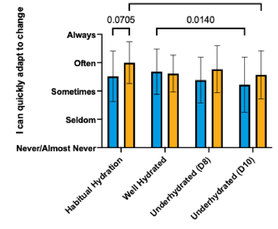
Those who were habitually well hydrated tended to express greater feelings of every school or work hour being tiring as water intake was reduced, which was not replicated in those who were habitually underhydrated.



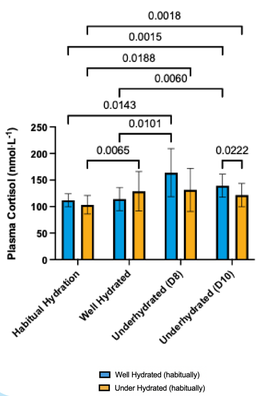
Patterns of feeling burnt out because of school or work were coincident with underhydration.



Those who were habitually well hydrated tended to express lower feelings of emotional exhaustion due to work or school while they were well hydrated. This benefit disappeared once underhydrated.



Those who were habitually well hydrated tended to not feel as capable of quickly adapting to change with reduced water intake.



Physiological stress, as evidenced by plasma cortisol, consistently increased with acutely reduced water intake.

Cortisol was greater in those who were habitually well hydrated versus underhydrated after four days (D10) of induced underhydration.

These data largely corroborate reports of greater physiological stress with underhydration practices.

Table 1. Correlations between plasma cortisol and burnout indices by hydration phase

	Baseline	Well Hydrated	Underhydrated	Underhydrated
Measure	D2	D6	D8	D10
Copenhagen Burnout Index (aggregate)	r= -0.17; p= 0.395; n= 28	r= 0.10; p= 0.590; n= 29	r= -0.47; p= 0.013; n= 28	Rho= -0.04; p= 0.841; n= 31
Overall feelings of stress over the past 24 hours.	Rho= -0.15; p= 0.405; n= 35	Rho= -0.10; p= .585; n= 35	r= 0.37; p= .033; n= 34	Rho= -0.09; p= 0.608; n= 38
Is school or work emotionally exhausting?	Rho= -0.25; p= 0.166; n= 33	Rho= -0.03; p= .885; n= 33	Rho= 0.21; p= 0.280; n= 29	Rho= -0.07; p= 0.685; n= 33
Do you feel burnt out because of your school or work?	Rho= -0.04; p= 0.832; n= 35	Rho= 0.10; p= .569; n= 35	Rho= -0.31; p= 0.077; n= 34	Rho= 0.16; p= 0.347; n= 37
Does school or work frustrate you?	Rho= -0.22; p= 0.203; n= 35	Rho= -0.05; p= .785; n= 34	Rho= -0.20; p= 0.267; n= 34	Rho= -0.12; p= 0.486; n= 37
Do you feel worn out at the end of the day?	Rho= -0.23; p= 0.203; n= 35	Rho= 0.12; p= .484; n= 35	Rho= 0.04; p= 0.803; n= 34	Rho= 0.02; p= 0.923; n= 38
Are you exhausted in the morning at the thought of another day?	Rho= -0.24; p= 0.171; n= 33	Rho= -0.14; p= .454; n= 33	Rho= -0.13; p= 0.486; n= 33	Rho= -0.19; p= 0.267; n= 36
Do you feel that every school or working hour is tiring?	Rho= 0.03; p= 0.891; n= 31	Rho= -0.01; p= .975; n= 34	Rho= 0.01; p= 0.934; n= 34	Rho= 0.03; p= 0.862; n= 37
Do you have enough energy for family and friends during leisure time?	Rho= 0.21; p= 0.233; n= 35	Rho= 0.02; p= .892; n= 34	Rho= -0.06; p= 0.745; n= 34	Rho= 0.10; p= 0.562; n= 38
I am confident that I can handle every challenge	Rho= 0.23; p= 0.175; n= 35	Rho= -0.13; p= .452; n= 35	Rho= 0.37; p= 0.030; n= 34	Rho= 0.25; p= 0.127; n= 38
I am curious what development lies ahead of me	Rho= 0.10; p= 0.564; n= 35	Rho= 0.13; p= .462; n= 35	Rho= -0.10; p= 0.578; n= 34	Rho= 0.29; p= 0.080; n= 38
I can handle new and unknown situations well	Rho= -0.06; p= 0.717; n= 35	Rho= -0.15; p= .391; n= 35	Rho= 0.39; p= 0.024; n= 34	Rho= 0.21; p= 0.215; n= 38
I can quickly adapt to change	Rho= 0.08; p= 0.641; n= 35	Rho= -0.29; p= .093; n= 35	Rho= 0.39; p= 0.022; n= 34	Rho= 0.31; p= 0.055; n= 38
If I have to change my plans, I stay relaxed	Rho= -0.02; p= 0.905; n= 35	Rho= -0.02; p= .927; n= 35	Rho= -0.18; p= 0.295; n= 34	Rho= 0.24; p= 0.143; n= 38
Get energy from unexpected things and changes	Rho= 0.12; p= 0.486; n= 35	Rho= -0.35; p= .042; n= 35	Rho= -0.23; p= 0.196; n= 34	Rho= 0.10; p= 0.556; n= 38

Blue text and yellow borders represent statistically significant correlations, and blue text without yellow boarders represents trending correlations.

Relationships between plasma cortisol and perceived burnout indices were most notably altered after two days of induced underhydration (D8).

CONCLUSION

These data indicate the importance of habitual water intake on perceived stress, though short-term changes appear to account for variability in burnout indices. However, the observed changes in perceived stress could have been influenced, in part, by participation in the study itself (including aspects of behavior change and self-monitoring), independent of the hydration intervention. Nonetheless, optimizing daily water intake may be a cost effective, low side effect, and accessible tool for reducing feelings of school/work burnout. Likewise, this simple strategy could be a viable and practical method for improving mental well-being, and thus personal and community health.

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