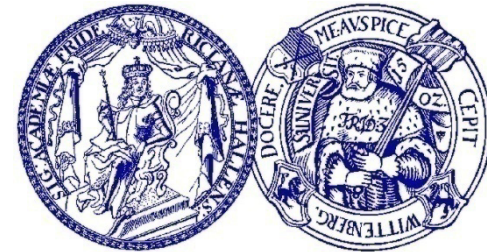


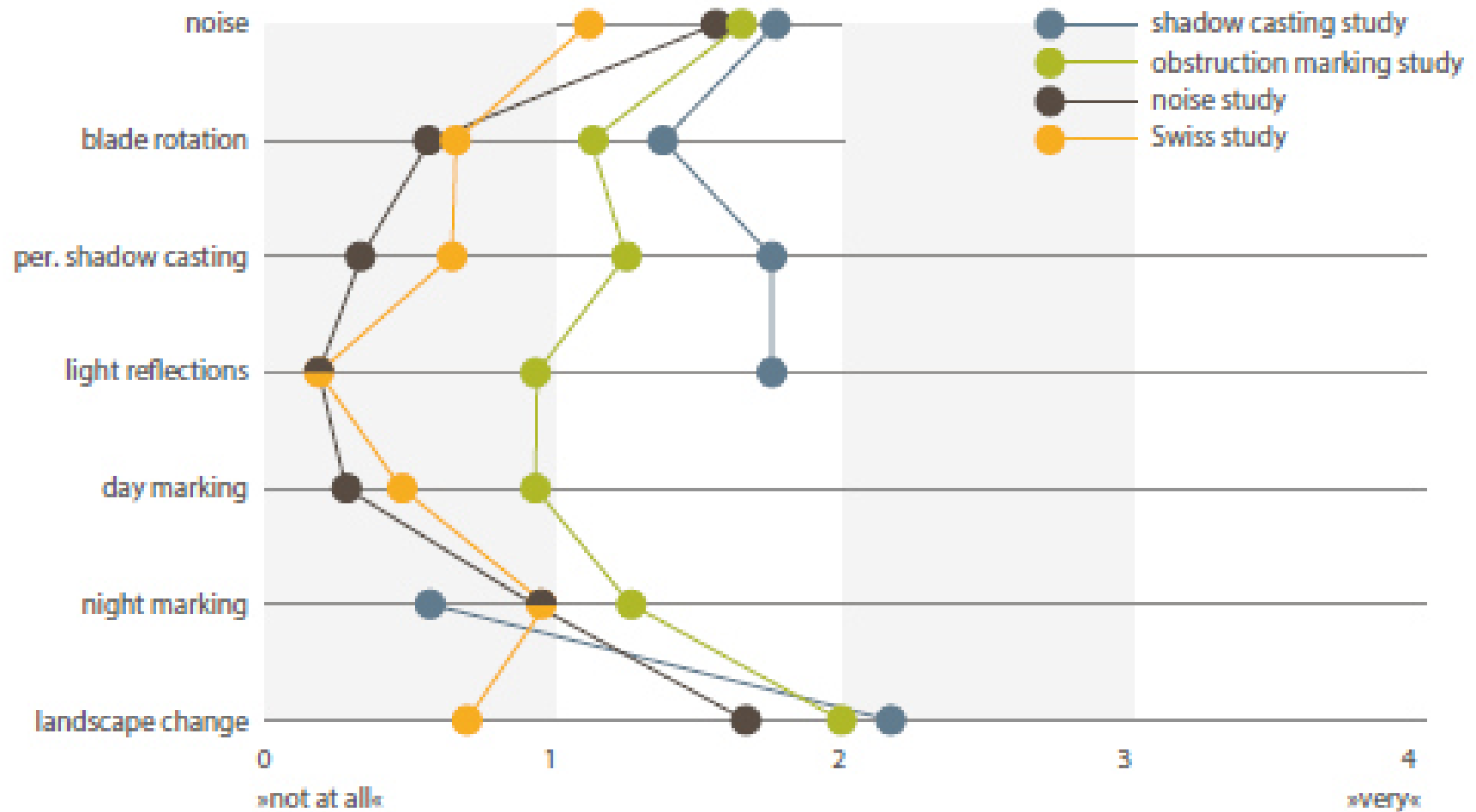
# Residents and Obstruction Markings: Challenges for the Acceptance

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8. March 2017, MEEM, Paris

# Annoyance induced by WT immissions



# Predicting the acceptance of local wind farm (obstruction marking study; $R^2_{adj.} = .60$ )

	$\beta$
distance to nearest WT	/
number of visible WT	/
strain during planning and construction	-.13*
annoyance by noise	-.22*
annoyance by landscape change	-.41*
annoyance by day marking	-.15*
annoyance by night marking	/

# Situation in 2010

- increased WT height with total height > 100 m
- aircraft obstruction markings obligatory
- residents complains
- stress effects of obstruction markings unknown
- open question whether regulations are necessary
- study funded by



Federal Ministry for the  
Environment, Nature Conservation  
and Nuclear Safety

Landesamt für  
Landwirtschaft, Umwelt  
und ländliche Räume  
Schleswig-Holstein



# Method

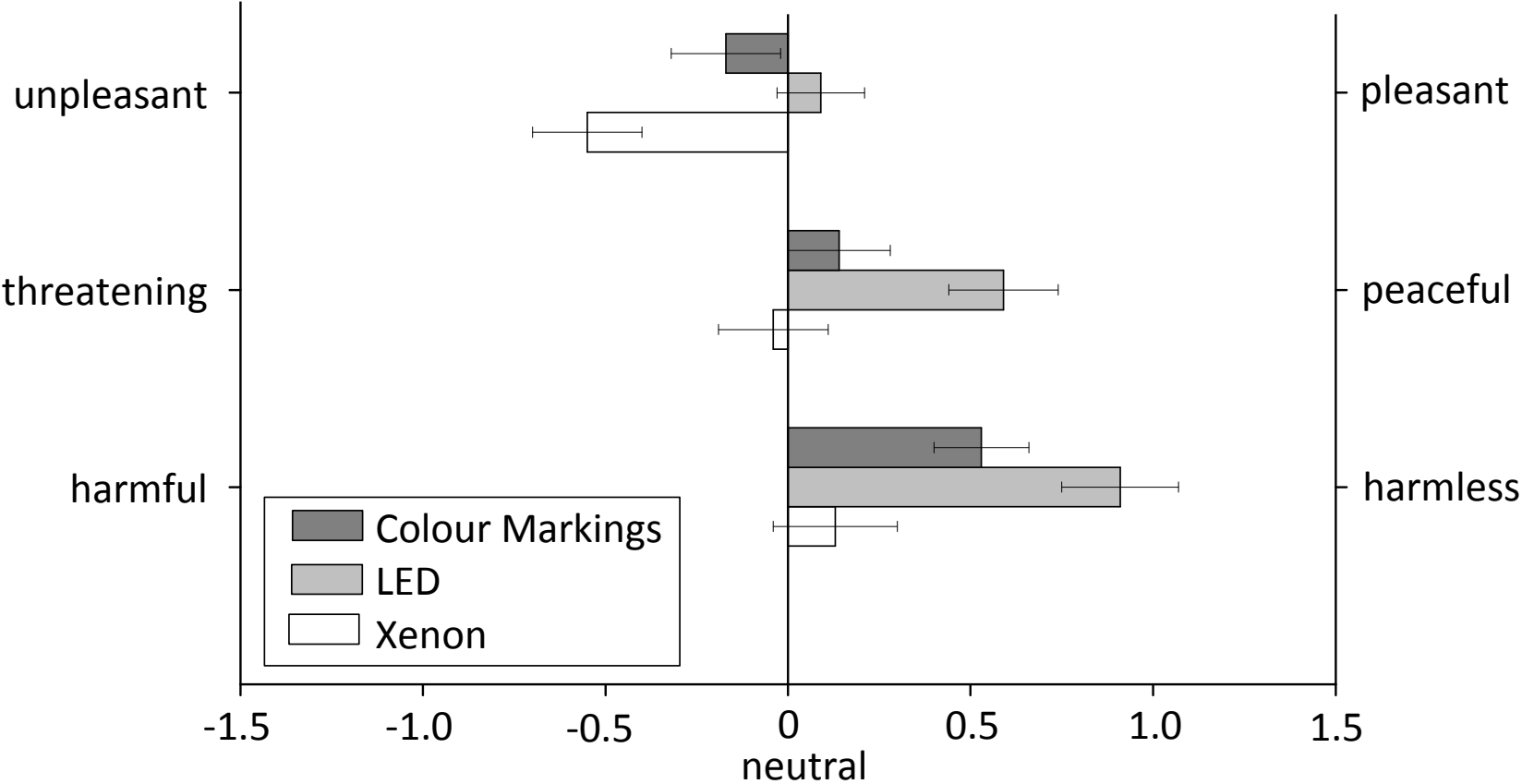
- methods of stress and environmental psychology
- 420 residents with wind farm view
- questionnaire survey
- day marking: white xenon, white LED, colour markings
- night marking: red light (LED, fire w red)
- synchronisation vs. no synchronisation
- light intensity adjustment vs. no adjustment

# Questionnaire

- 590 items
- stress indicators: annoyance, somatic and psychological symptoms, ordinary behaviour, coping responses
- acceptance: local wind farm, wind energy
- sociodemographic features

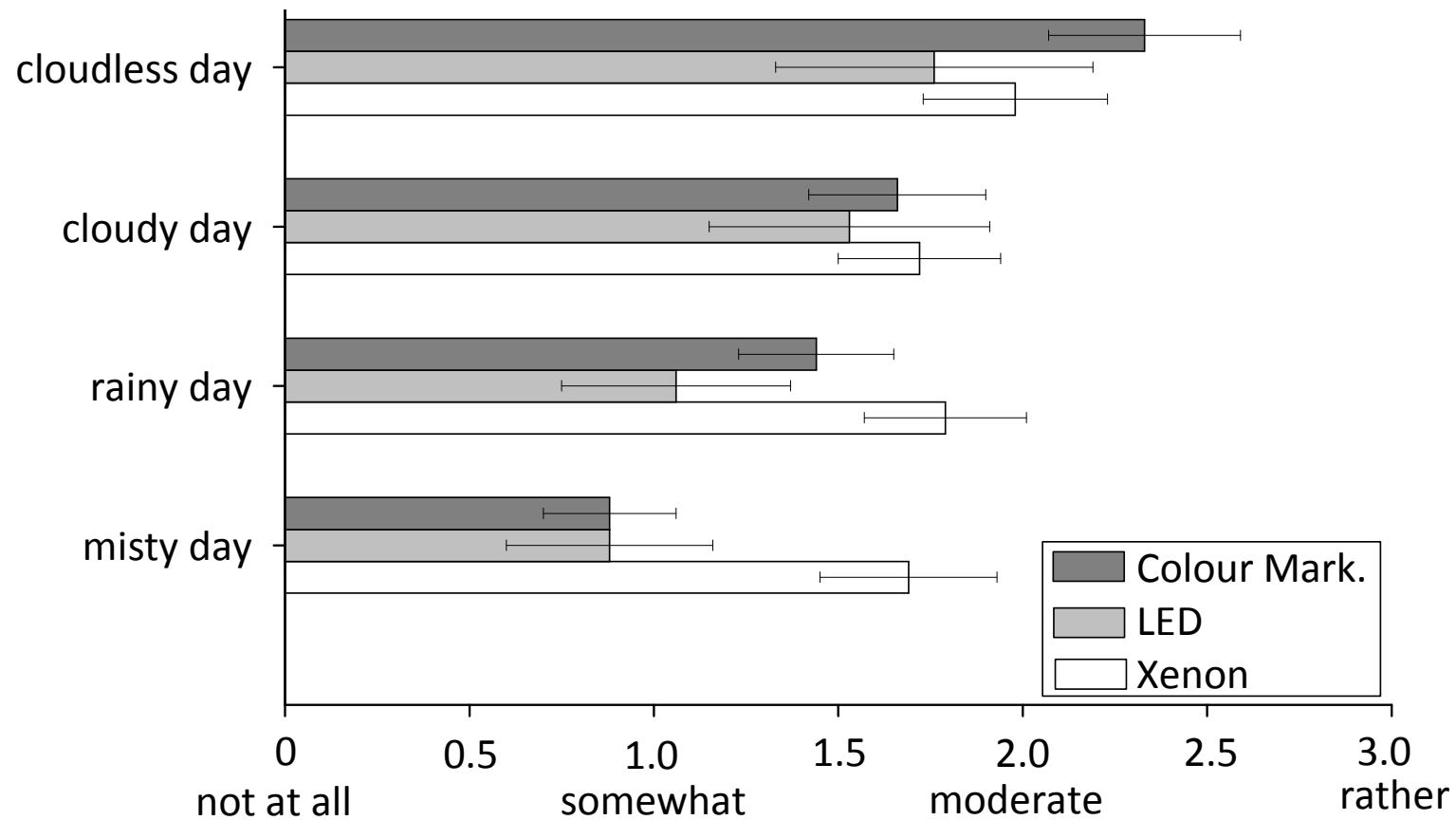
# Results

# General evaluation

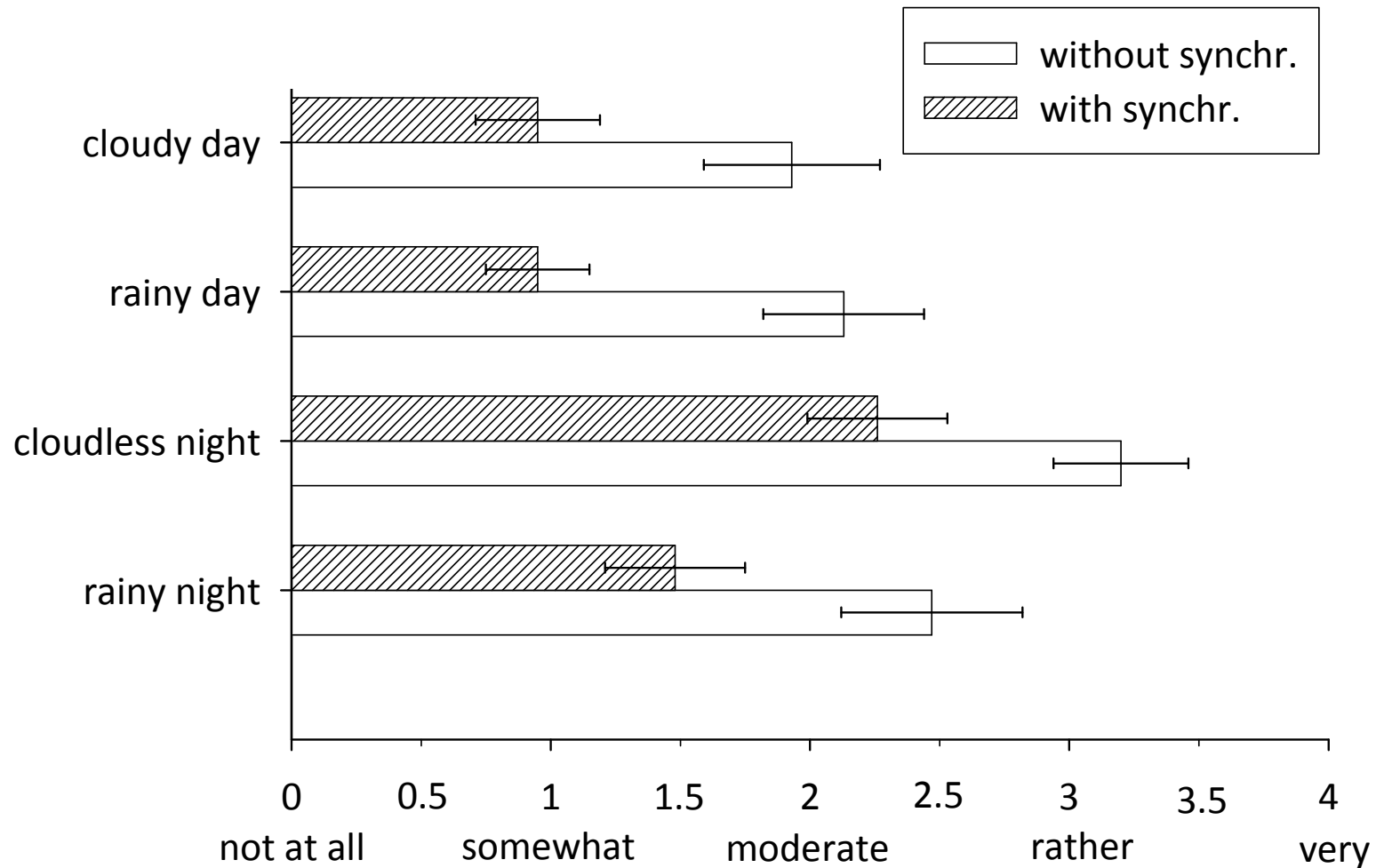




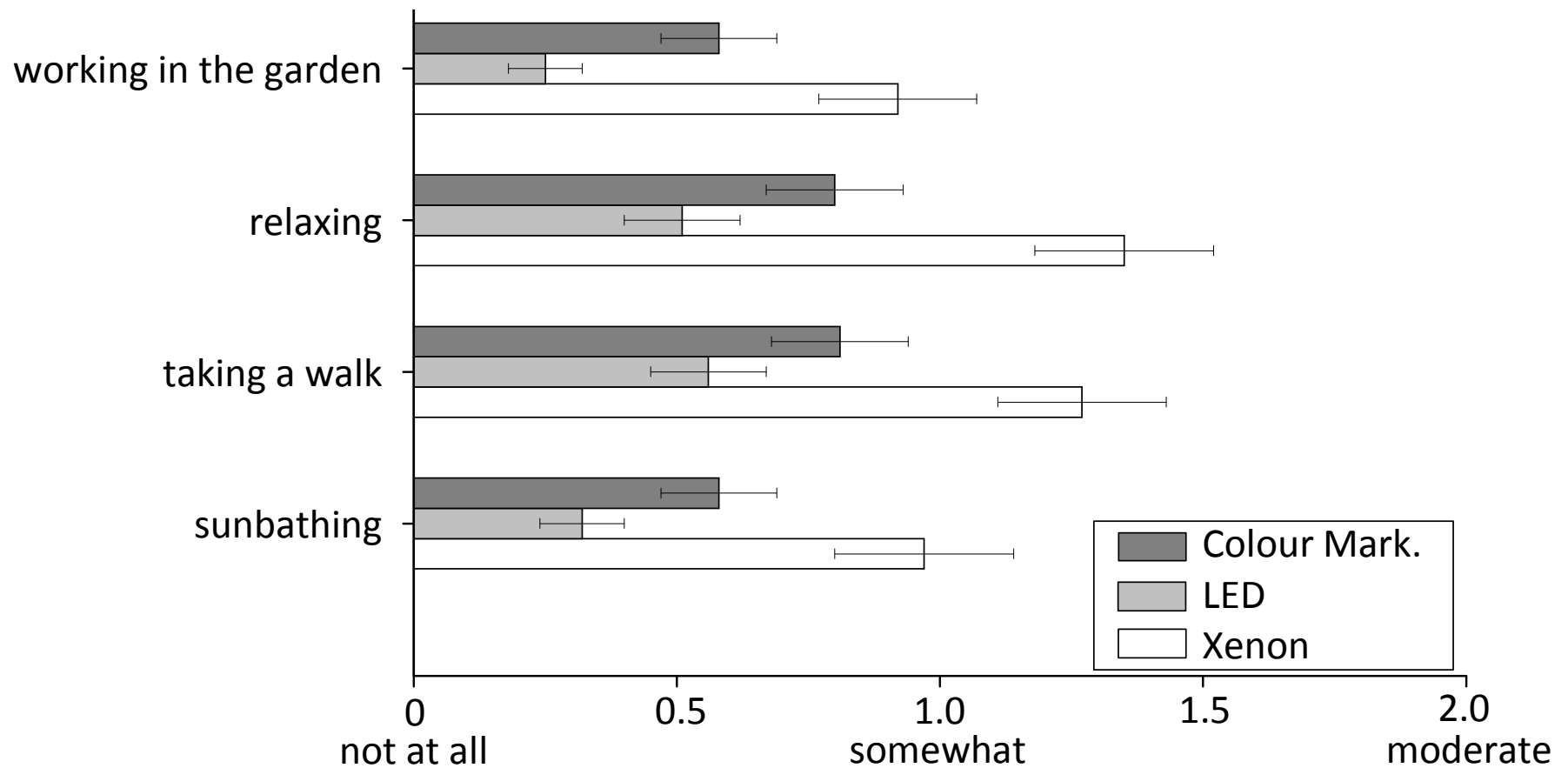
# Annoyance and weather conditions 1



# Annoyance and weather conditions 2



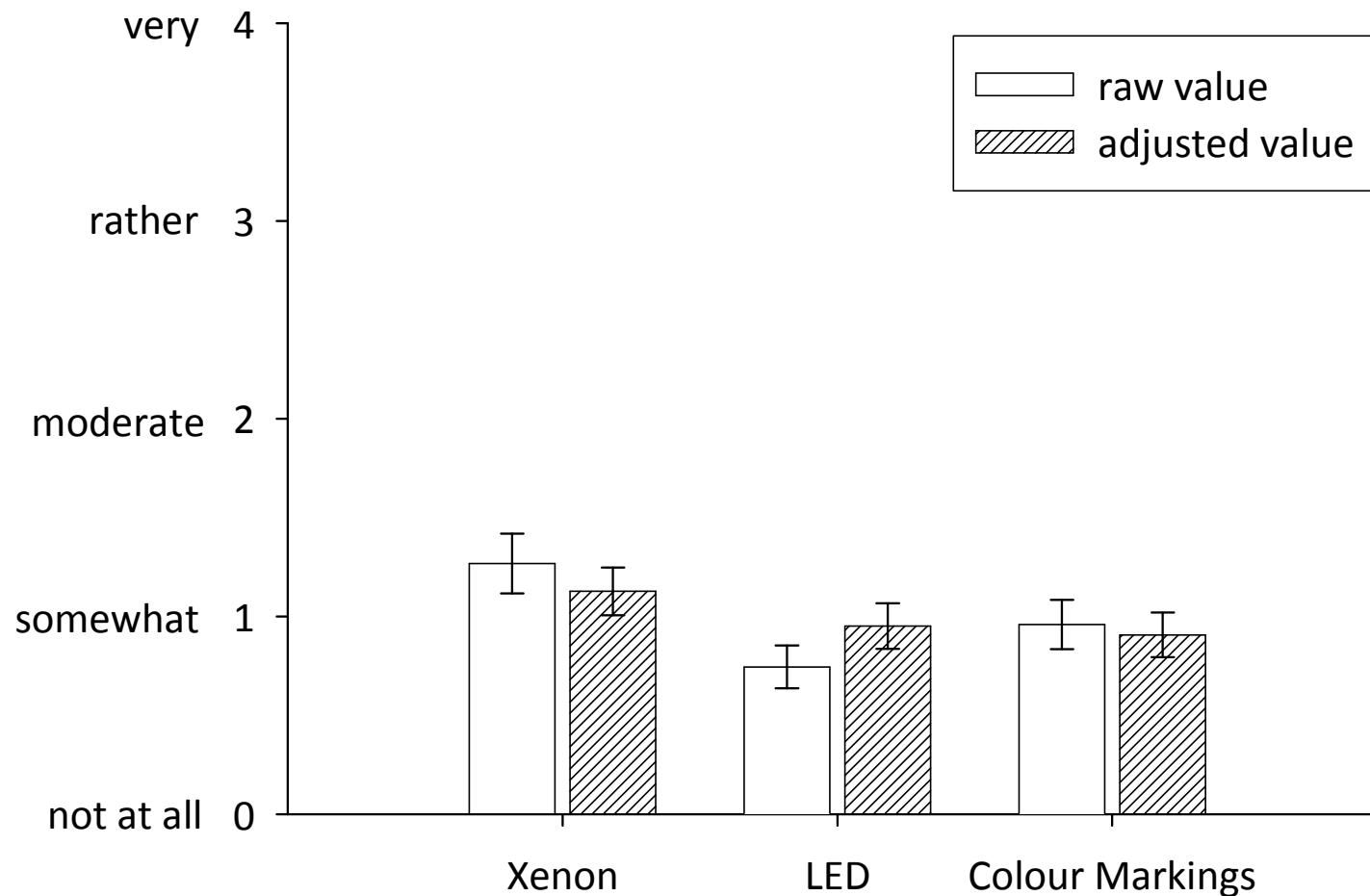
# Impairment of activities



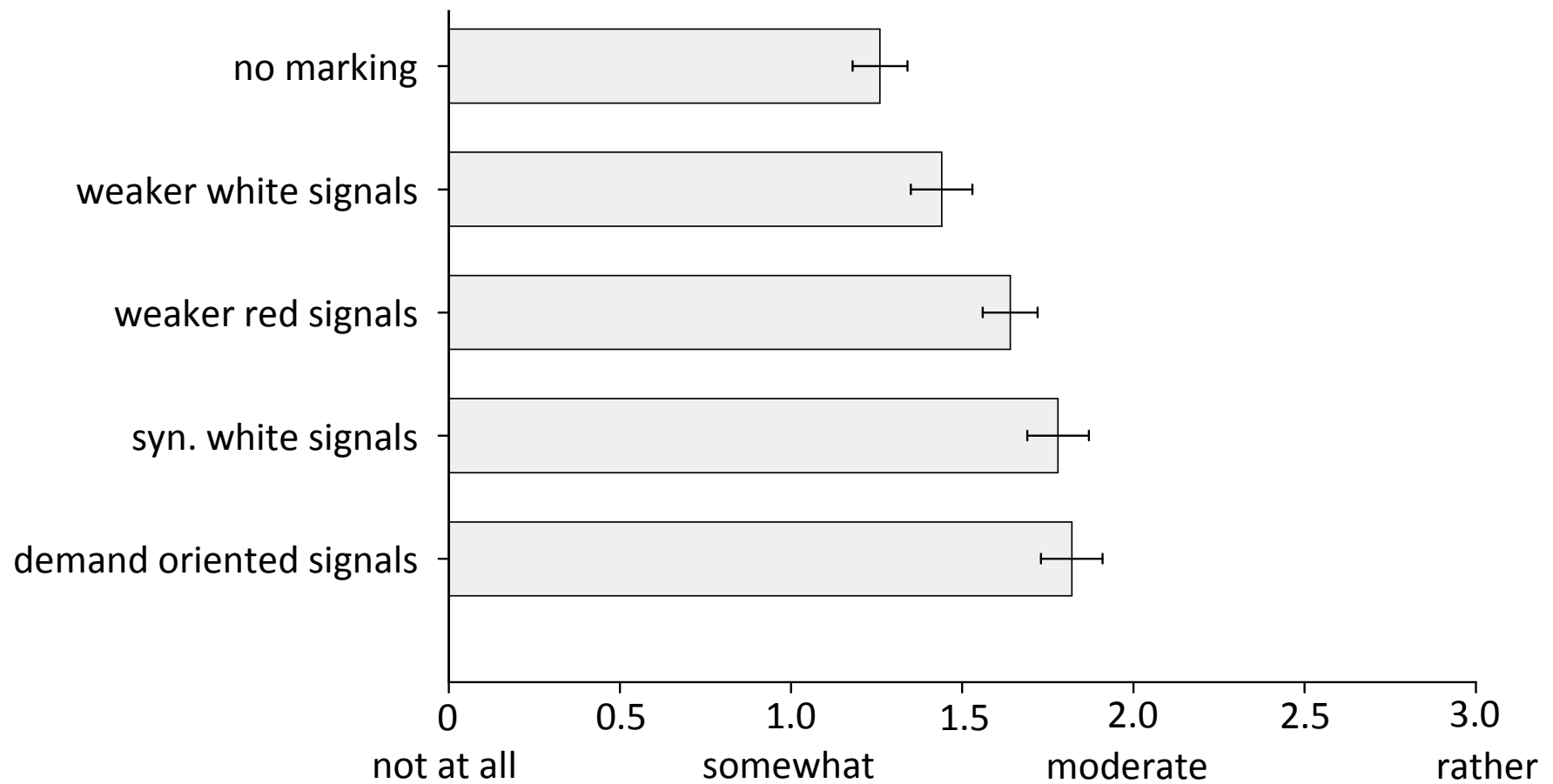
# Coping responses

- xenon: using curtains, blinds, talking to others, complain to authorities or wind farm operators, search for legal advice
- without intensity adjustment: installing a shade, talking to others

# Annoyance and „strain during the planning and construction phase“



# Preferences



# Conclusions

- total sample: no substantial annoyance
- problematic: xenon, cloudless night
- obstruction markings influence general acceptance

# Recommendations

- LED or colour markings
- synchronisation
- light intensity adjustment
- demand oriented navigation lights
- positive, transparent planning and construction process



## Publications

Pohl, J., Hübner, G. & Mohs, A. (2012).  
Acceptance and stress effects of aircraft obstruction  
markings of wind turbines. *Energy Policy*, 50, 592–600.

Rudolph, D. et al. (2017). Spoiled darkness? Sense of  
place and annoyance over obstruction lights from the  
world's largest wind turbine test centre in Denmark.  
*Energy Research & Social Science*, 25, 80–90.



Thank You!