



**Perceived Stress and Social Networks among Young Adults
Measuring Social Interactions with Mobile data and Self-reports**

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Publication date:
2016

Citation for published version (APA):
Dissing, N., Jørgensen, T. B., Gerds, T. A., Rod, N. H., & Lund, R. (2016). *Perceived Stress and Social Networks among Young Adults: Measuring Social Interactions with Mobile data and Self-reports*. Poster session præsenteret ved Sunbelt, NEWPORT BEACH, USA.

Introduction

Background

- Research has established social relations as protective against stress and poor mental health.¹
- Less research has focused on whether young adults perceiving stress are limited in engaging in social interactions.
- For young adults, interacting socially with peers and family is crucial for well-being, hence it is important to investigate whether and how social interactions are affected by prior stress levels.

Aim

- To investigate if perceived stress in young adults affects social interaction behavior. Further, we aimed at measuring social interactions with mobile data in addition to self-reports in order to consider both objective and subjective evaluations of social interactions.

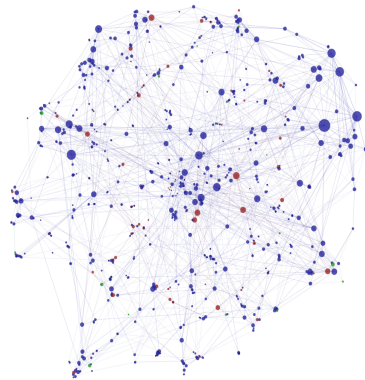


Figure 1: Visualisation of interaction network measured with call frequency. Red nodes are individuals reporting high stress and the size of the nodes corresponds to the average interaction frequency.

Material and methods

Data

- Data was derived from the Copenhagen Network Study where 790 undergraduate students were followed for approximately 8 months (response rate=30%).
- The participants were followed via surveys and personalized mobile phones running customized software recording amongst other Bluetooth scans, calls, and SMS (not content).

Measurements

- Perceived stress was measured by using the Perceived Stress Scale (PSS)² – a ten item instrument reported at baseline. A binary version of the PSS was used in order to identify individuals with high stress.
- The frequency of social interactions with parents and friends was measured at baseline with the Copenhagen Social Relation Questionnaire³, and these measures of social interactions were obtained from mobile phone data (Table 1)

Table 1: Measures of social interactions

Mobile phone	
The <i>diversity</i> of social interactions	The number of individuals interacted with via call and SMS pr. month
The <i>frequency</i> of social interactions	The number of calls and SMS pr. month
The <i>duration</i> of social interactions	The mean duration of calls, and face-to-face meetings registered with Bluetooth scans per month
Self-report	
Contact frequency with parents and friends	Frequent contact, rare contact

Analytical strategy

- Random effects models were used to estimate the association between perceived stress and different measures of social interactions taking into account the nested interaction structure of each participant.
- Models were adjusted for confounders identified a priori (sex, age, and personality traits).⁴



Results

Stress and mobile phone measures of social interactions

- Young adults reporting stress interact more frequently, and with more individuals via call and text messages than non-stressed individuals.
- With respect to the duration of interactions, stressed individuals appear to interact for a longer period via phone calls, but for a shorter period when it comes to face-to-face meetings compared to non-stressed individuals.

Table 2: Random effects models of the association between perceived stress and social interactions measured with smartphones

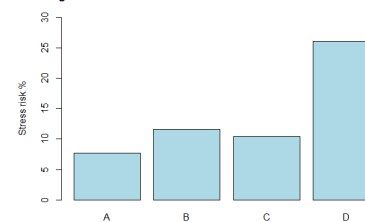
	Total		Adjusted*		Fully adjusted [□]	
	Mean	SD	Mean diff.	95%CI	Mean diff.	95%CI
Diversity (N=790)						
Individuals called/month	24	17	4	0,7	6	2,9
Individuals texted/month	31	17	4	1,8	7	3,10
Frequency (N=790)						
Number of calls/month	84	102	24	4,43	27	7,48
Number of SMS's/month	408	465	96	5,187	141	46,236
Duration (N=790, N=555)						
Mean duration/call**	6	5	1	1,2	1	1,2
Mean duration/meeting***	54	35	-8	-15,0	-9	-17,0

*Adjusted for age and sex, [□]Adjusted for age, sex and personality traits, mean difference for high stress compared to low stress, 95%CI=95% confidence intervals, **Duration in minutes, *** Duration in minutes per face-to-face meeting with fellow students.

Stress and self-reported social interactions

- High stress is associated with frequent contact with parents, and with rare contact with friends.

Figure 2: Stress and Social Interactions with Parents and Friends



A: Rare contact parents, frequent contact friends
 B: Frequent contact friends, frequent contact parents
 C: Rare contact parents, rare contact friends
 D: Frequent contact parents, rare contact friends

Discussion

Summary of findings

- Individuals reporting high stress are engaging in social interactions more frequently via calls and text messages, and they appear to spend shorter time in social interactions meeting face-to-face with fellow students. This pattern is also reflected in the self-reported social interactions where individuals reporting high stress had a higher contact frequency with parents and a lower contact frequency with friends.

Interpretation

- Frequent calling and texting in individuals with high stress could be a coping strategy. Self-report measures suggest that this coping is primarily focused on contact with parents.
- Another explanation is that having too many friends is perceived as being stressful, or more specifically that excessive calling and texting is inducing stress.

Limitations

- Social interaction measures obtained from mobile phone data is likely to also contain effects of phone use.
- The content of the social interaction measured with mobile data is not accessible, e.g. frequent calling could be quarrel.
- Low response rate increases the risk for selection bias.
- The results are based on a selected group of university students which limits the generalizability to disadvantaged young adults.

References

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Acknowledgements and contact

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