Supplementary Material A

Descriptive Statistics and Response Rates

Table A1

Means, Standard Deviations, Frequencies, and Response Rates for Each Variable

Variable	***M* (*SD*)** **Total sample**	***M* (*SD*)** ***Per group***		***M (SD)*** **response rates (%)**	**Range Response rates (%)**
	***N* = 139**	**HSP (*n* = 72)**	**Non-HSP (*n* = 67)**		
Observation				99.30 (3.60)	65.70- 100
Beep				99.30 (3.60)	65.70- 100
Day				99.30 (3.60)	65.70- 100
Overstimulation	4.34 (0.54)	4.43 (0.52)	4.24 (0.55)	86.20 (16.50)	34.40- 100
SPS	5.04 (0.86)	5.73 (0.33)	4.26 (0.53)	97.20 (14.90)	0-100
Pleasantness Higher Senses	4.02 (0.68)	3.72 (0.61)	4.34 (0.60)	84.40 (17.70)	28.60-100
Pleasantness Lower Senses	4.61 (0.56)	4.49 (0.56)	4.73 (0.55)	84.30 (18.20)	20-100
Mood	4.51 (0.79)	4.27 (0.79)	4.77 (0.71)	84.40 (17.70)	28.60-100
Fatigue	4.24 (1.09)	4.64 (0.99)	3.80 (1.01)	84.20 (18.20)	17.10-100
Alone versus with others (whom)	49.50% with others	49.40% with others	49.60% with others	66.10 (21.70)	8.60-97.10
Private versus public (where)	30.20% in public environments	27% in public environments	34.20% in public environments	77.10 (19)	17.10-100

Note. SPS = Sensory Processing Sensitivity, categorized as HSP versus non-HSP. For all time-variant continuous variables the within-person means were calculated, for SPS a between-person mean was calculated. Mood was coded with scores higher scores indicating positive mood; Fatigue entails both physical and mental fatigue. For the type of the environment (alone versus with others and private versus public) frequencies were reported.

Supplementary Material B

Pearson Correlations

Table B1

Pearson Correlations Between the Continuous Variables Included in the Analyses

Variable	1.	2.	3.	4.	5.	6.
1.Overstimulation	-					
2.SPS	.11***	-				
3.Pleasantness Higher Senses	-.19***	-.25***	-			
4.Pleasantness Lower Senses	-.10***	-.13**	.45***	-		
5.Mood	-.19***	-.30***	.39***	.35***	-	
6.Fatigue	.13***	.24***	-.23***	-.24***	-.56***	-

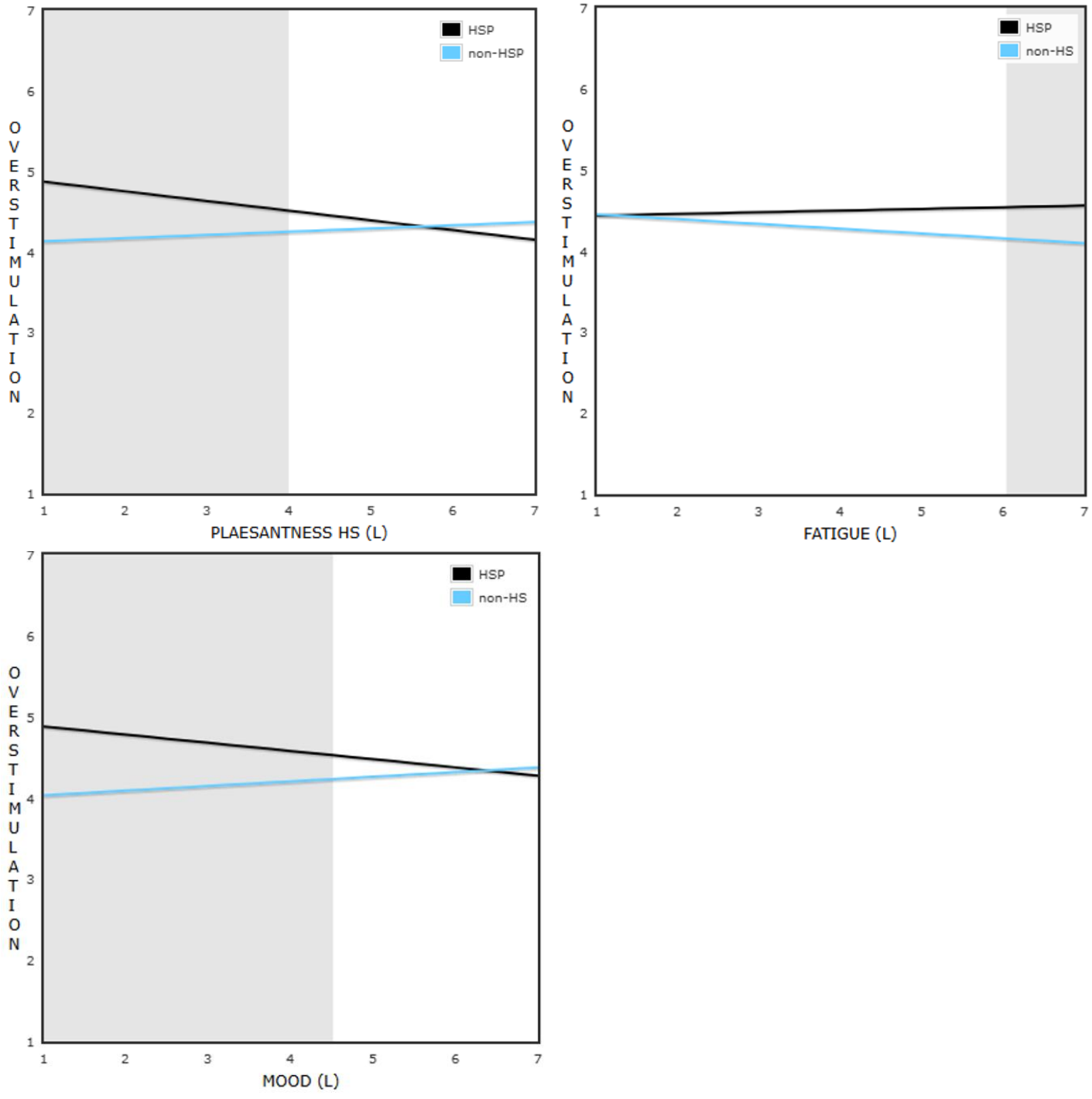
Note. SPS = Sensory Processing Sensitivity; Mood was coded with higher scores indicating positive mood; Fatigue entails both physical and mental fatigue; ** $p < .01$; *** $p < .001$.

Supplementary Material C

Significant Interactions with Lagged Predictors

Figure C1

Overstimulation as Predicted by the Interactions of SPS and Pleasantness of High Sense Stimuli (Top Left), Fatigue (Top Right), and Mood (Bottom) as Reported at the Previous Beep (Lagged Variables)



Note. The grey areas represent the Regions of Significance with respect to X (i.e., Pleasantness high senses, Fatigue, or Mood). HS= high sense stimuli; L = lagged.

Supplementary Material D

Controlling for Age and Sex

Table D1

Multilevel Random Intercept and Slope Model Results Predicting Fluctuations in Overstimulation Including Age and Sex as Covariates (Model 1)

Model 1	**B (SE)**	***p* -value**
Intercept	4.08*** (0.15)	<.001
Age	0.00 (0.01)	0.48
Sex	-0.22 (0.12)	0.08
Beep	0.45*** (0.08)	<.001
Beep²	-0.07*** (0.01)	<.001
Weekday	-0.07 (0.05)	0.17
SPS	0.15 (0.13)	0.28
Beep*SPS	0.04 (0.12)	0.72
Beep²*SPS	-0.01 (0.02)	0.64
Weekday *SPS	-0.01 (0.08)	0.38
ICC	.25	
R^2 (fixed effects)	.06	
R^2 (total)	.30	

Note. SPS = Sensory Processing Sensitivity, categorized as HSP versus non-HSP; Beep² is the quadratic term of beep. ICC= Intraclass correlation coefficient. R^2 = proportion of variance explained by the fixed effects and/or fixed and random effects. Sex was coded with 1 as Female and 2 as Male.

*** $p < .001$.

Table D2

Multilevel Random Intercept and Slope Model Results Predicting Overstimulation by SPS, the Pleasantness of Stimuli in the Current Environment, the Type of Environment, Mood and Fatigue, and its interactions, Including Momentary and Lagged Variables (Model 2-5), Including Age and Sex as Covariates

	Within-person centered predictors (momentary observations)		**Time-lagged predictors (previous observation)**	
	B (SE)	***p* -value**	**B (SE)**	***p* -value**
Model 2:				
Pleasantness of stimuli				
Intercept	4.08*** (0.12)	<.001	4.06*** (0.23)	<.001
Age	0.01 (0.00)	0.575	0.00 (0.00)	0.579
Sex	-0.17 (0.11)	0.110	-0.23 (0.13)	0.080
Pleasantness high senses	-0.11* (0.05)	0.022	0.05 (0.03)	0.190
Pleasantness low senses	-0.10** (0.04)	0.007	0.01 (0.04)	0.880
SPS	0.13 (0.09)	0.15	0.86** (0.27)	0.002
Pleasantness high senses * SPS	-0.23*** (0.07)	<.001	-0.17** (0.05)	0.001
Pleasantness low senses * SPS	0.02 (0.05)	0.683	-0.01 (0.06)	0.920
ICC	.25		.20	
R^2 (fixed effects)	.06		.02	
R^2 (total)	.30		.21	

Model 3: Type of environment				
Intercept	4.12*** (0.22)	<.001	4.23*** (0.14)	<.001
Age	0.00 (0.00)	0.586	0.00 (0.00)	0.593
Sex	-0.15 (0.12)	0.200	-0.22 (0.13)	0.086
Alone versus with others	0.43** (0.14)	0.002	0.15*(0.07)	0.023
Private versus public	0.43* (0.20)	0.030	0.05 (0.07)	0.437
SPS	0.18 (0.09)	0.060	0.10 (0.11)	0.367
Alone versus with others * SPS	-0.17 (0.09)	0.060	-0.12 (0.10)	0.239
Private versus public * SPS	0.05 (0.13)	0.730	0.14 (0.11)	0.182
ICC	.23		.39	
R^2 (fixed effects)	.06		.01	
R^2 (total)	.27		.39	
Model 4: Fatigue				
Intercept	4.12*** (0.11)	<.001	4.53*** (0.15)	<.001
Age	0.00 (0.00)	0.143	0.00 (0.00)	0.603
Sex	-0.14 (0.11)	0.210	-0.28* (0.11)	0.017
Fatigue	0.02 (0.03)	0.495	-0.06* (0.03)	0.01
SPS	0.14 (0.09)	0.134	-0.15 (0.16)	0.333
Fatigue *SPS	0.13** (0.05)	0.003	0.08* (0.04)	0.023
ICC	.23		.20	
R^2 (fixed effects)	.03		.02	
R^2 (total)	.25		.21	
Model 5: Mood				

Intercept	4.15*** (0.12)	<.001	3.89*** (0.28)	<.001
Age	0.00 (0.00)	0.341	0.00 (0.00)	0.289
Sex	-0.07 (0.11)	0.558	-0.26* (0.12)	0.035
Mood	-0.12 (0.07)	0.055	0.06 (0.04)	0.178
SPS	0.16(0.09)	0.094	0.98** (0.35)	0.006
Mood*SPS	-0.27** (0.09)	0.002	-0.16** (0.06)	0.006
ICC	.26		.21	
R^2 (fixed effects)	.05		.02	
R^2 (total)	.30		.22	

Note. SPS = Sensory Processing Sensitivity, categorized as HSP versus non-HSP; Alone was coded as 0 and with others as 1. Private was coded as 0 and in public places (including the work or school environment) as 1. ICC= Intraclass correlation coefficient. R^2 = proportion of variance explained by the fixed effects and/or fixed and random effects. Sex was coded with 1 as Female and 2 as Male.

*$p < .05$; **$p < .01$; *** $p < .001$

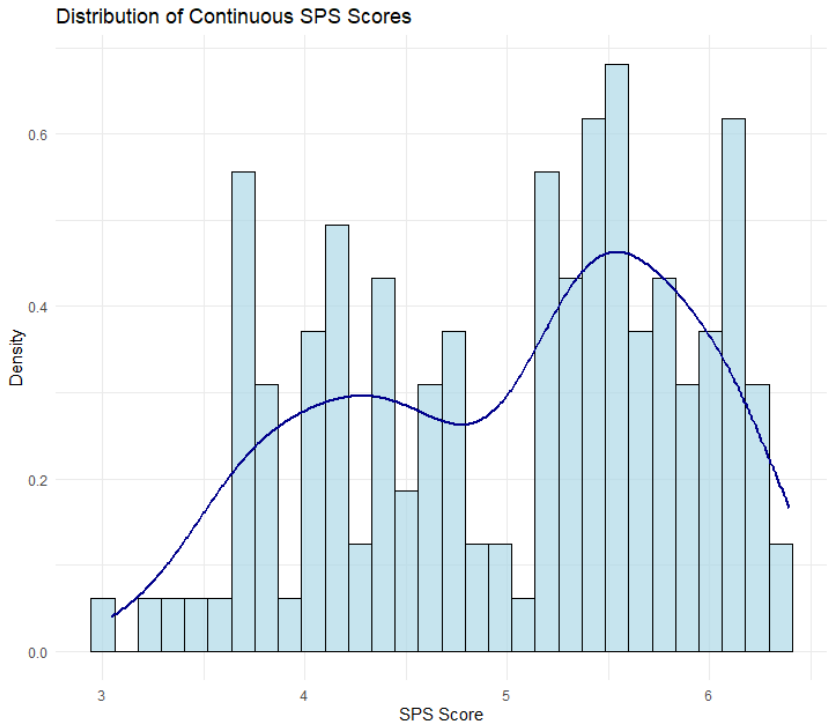
Supplementary Material E

The Distribution of SPS scores

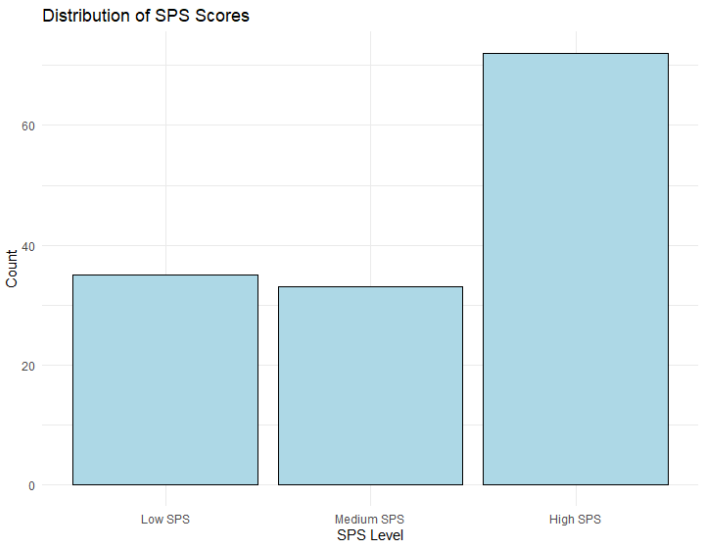
Figure E1

The Distribution of SPS scores among the Final Sample, as a Continuous Score (a) and a Categorical Score (b)

a



b



Supplementary Material F

Experience Sample Method questionnaire

Stimulation:

How much are you currently under- or overstimulated (-3 to +3)

Pleasantness sensory stimuli and stimulation

- How unpleasant to pleasant would you rate below stimuli, if present in your current environment: (scale: 1-7)
    - Lights
    - Sounds
    - Bright colors
    - Being touched (by others or by clothes)
    - Tastes
    - Smells
    - Moving objects (passing cars)
    - Art
    - Music
    - Temperature
    - Multiple stimuli at the same time
    - Other:….

Fatigue

- How physically tired are you? (1-7)
- How mentally tired are you? (1-7)

Mood

- How do you currently feel (mood): scale: 1-7
    - Happy (pos)
    - Irritated (neg)
    - Anxious (neg)
    - Satisfied (pos)
    - Uncertain (neg)
    - Lonely (neg)
    - Guilty (neg)
    - Relaxed (pos)
    - At ease (pos)
    - Suspicious (neg)
    - Sad (neg)
    - Restless (neg)
    - Gloomy (neg)
    - Relieved (pos)
    - Lethargic (neg)
    - Agitated (neg)
    - Stressed (neg)

- Energetic (pos)
- Good (pos)

Environment

- **Where are you at the moment?**
  - At home
  - With family or friends
  - At work or at school
  - Health care
  - Public activity (cinema, concert, …)
  - On the way (on the street, in the train, on the bike)
  - In nature
  - In the supermarket/bakery
  - In a bar or restaurant
  - In the sport club
  - Somewhere else:….
- **At the moment I am with:**
  - Nobody
  - Friend(s)
  - Colleague, classmate
  - My partner
  - Parent(s)
  - Brother(s)/sister(s)
  - Family (e.g., aunt, uncle, grandparents)
  - Acquaintance(s)
  - A health care provider (e.g., doctor, psychologist, physiotherapist)
  - Teacher
  - Roomie(s)
  - Unknown other(s)
  - Other: …..

Supplementary Material G

Exploratory and Confirmatory Factor Analyses Pleasantness of Stimuli

Based on theory (Köster, 2003) we checked whether we could reduce the number of dimensions measuring the pleasantness of stimuli across the different modalities by running an Exploratory Factor Analysis (EFA) using principal component analyses and varimax rotation. A multilevel CFA was run in R (package Lavaan) with observations nested within persons, with Full Information Maximum Likelihood (FIML) estimation to deal with missing data and using robust maximum likelihood (MLR) estimation to control for non-normality, to check the model fit indices of the suggested factor structure of the EFA. An acceptable fit is obtained when the Comparative Fit Index (CFI) is .90 or above, and the Mean Root Square Error of Approximation (RMSEA) and Standardized Root Mean Squared Residual (SRMR) are below 1 (Kline, 2016). Results of the EFA showed evidence for a two-factor solution. Factor 1 included lights, sounds, bright colors, moving scenes, music, and multiple stimuli at the same time, further referred to as high sense stimuli. Factor 2 included touches, smells, tastes, and temperature, further referred to as low sense stimuli. Multilevel CFA showed an acceptable model fit for the two-factor solution (CFI = .90, RMSEA = .06, SRMR = .06). The factor loadings are reported in Table G1.

Table G1

Standardized Factor Loadings of the Multilevel CFA Regarding Pleasantness of Stimuli Across Modalities

Pleasantness of Stimuli	**Pleasantness of High Sense (λ1)**	**Pleasantness of Low Sense (λ2)**
Lights	0.75***	
Sounds	0.71***	
Bright colors	0.74***	
Moving scenes	0.63***	
Music	0.43***	
Multiple stimuli	0.52***	
Touches		0.55***
Smells		0.48***
Tastes		0.40***
Temperature		0.52***

Note. **Λ** = standardized factor loading; *** $p < .001$.

Reference:

Köster, E. P. (2003). The psychology of food choice: Some often encountered fallacies. *The Sixth Sense - 6th Sensometrics Meeting*, *14*(5), 359–373. https://doi.org/10.1016/S0950-3293(03)00017-X

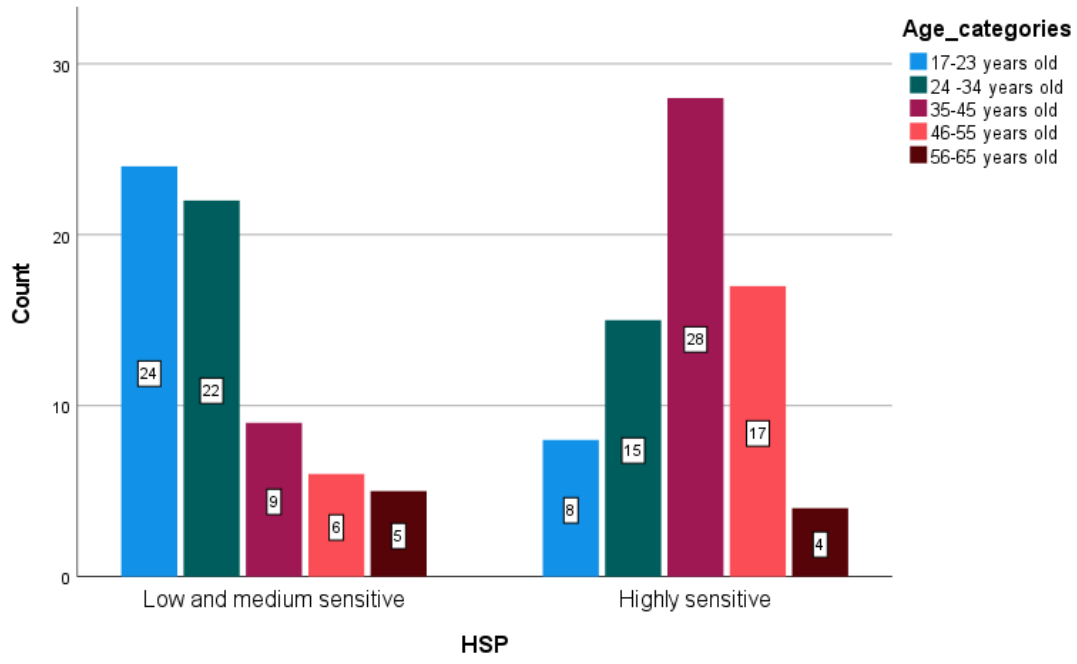
Supplementary Material H

The Distribution of Age and Sex According to the SPS Scores

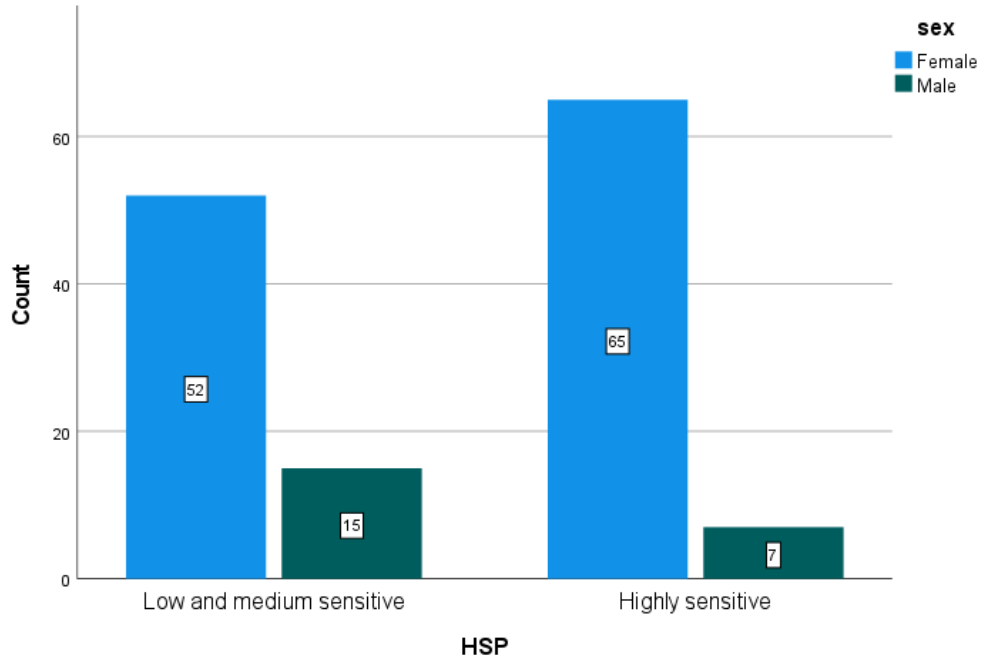
Figure H1

The Distribution of Age (a) and Sex (b) According to the SPS Scores

a



b)


sex
Female
Male
Count
60
40
20
0
52
15
65
7
Low and medium sensitive
Highly sensitive
HSP