Mental health and behaviour

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Tony Holland
IPWSO Health ECHO
International Prader-Willi Syndrome Organisation

Declarations: advisor to the pharmaceutical industry
1. Definitions of mental health and the terminology used to describe mental ill-health in people with PWS.

1. Causative mechanisms for mental ill-health – biological vulnerability and environmental demands.

Good mental health is more than ‘the absence of mental disorder’. It includes....

– A dynamic internal state or equilibrium
– The ability to maintain harmony in line with universal values
– The ability to recognise, express and modulate emotions
– The ability to cope with adverse events and function socially
Mental Health
Maintaining equilibrium in a changing environment

Good mental health requires the development of the necessary cognitive, social and functional skills and the ability to regulated emotional and affective states

- Feelings and behaviours a manifestations of homeostasis (Damasio: The Strange Order of Things)
- The brain is the decision maker of the body and is dependent upon internal and external sensory input to maintain and update a model of the world (Friston: Predictive Coding Mode, Free Energy Principle)
Neuropsychiatric (behavioural phenotype) of PWS

• Numerous studies from different countries:
  • Emergence of hyperphagia in early childhood (100%)
  • Repetitive and ritualistic behaviours (50 to 60%)
  • Emotional (temper) outbursts, episodic dyscontrol (60 to 80%)
  • Skin picking (40 to 60%)
  • Non-psychotic mood disorders (15 to 20%)
  • Psychotic illness (predominately in those with mUPD – 60%)

• Mean Full Scale IQ 60 with different verbal/performance profiles in del vs mUPD
• Impairments in executive and social functioning and in educational attainments

(see Whittington 2003 for summary in Prader-Willi Syndrome Edited by C. Hoybye Nova Science Publishers)
Atypical development in people with PWS

• Impaired development of the ability to regulate:
  – Food intake in line with energy expenditure
  – Response to threat in an efficient and appropriate manner
  – Mood in response to life events
  – Temperature in response to environmental change

• Impaired development of those cognitive skills that allow an accurate and efficient model of the external world to be developed and up-dated over time
Temper outbursts in PWS
Rice et al 2018 AJMG

• Survey of 101 families
• Behaviour worse in adolescence
•Characteristic onset and course

• Triggered by:
  – Goal blockage
  – Social injustice (perceived and real)
  – Difficulty dealing with change

• Interventions
  – Give space and distract only effective intervention
  – Risperidone, sertraline, fluoxetine regularly used but of limited value
Temper outbursts in children with PWS
Woodcock et al 2011

• Single case design investigating the relationship between cognitive demand and outbursts
  – Increased temper outbursts when cognitive challenge required switching of attention
  – In experimental and naturalistic settings increased temper outbursts related to unexpected change

• Specific directional relationship between a particular cognitive deficit and behaviour via an environmental interaction
Transcutaneous Vagus Nerve Stimulation (t-VNS)

Mean Number of Temper Outbursts per Day

Manning et al, 2019 [https://doi.org/10.1371/journal.pone.0223750]
Understanding the repetitive and ritualistic behaviours and temper outbursts in PWS

• Temper outbursts and ritualistic and repetitive behaviours - common mechanism in developmental delay and in impaired attention switching
• Repetitive questioning related to ‘anxiety’ due to uncertainty and change
• Emotional dysregulation consequent upon impaired ANS functioning (observations from VNS)
• Environmental circumstances and response to outbursts – maintain behaviours (acquire a function)

• Interventions
  – Functional analysis and behavioural/environmental interventions
  – Improving attention switching through training
  – Treatment of co-morbid psychopathology
  – Interventions aimed at altering sympathetic/parasympathetic balance (e.g. VNS, psychological techniques)

SKIN PICKING IN PEOPLE WITH PWS

Functional analysis of eight people with PWS. High levels of skin picking were observed in the alone and ignore conditions for eight of the twelve participants.


Hall et al 2015 Human Brain Mapping 36; 4135-4143 fMRI study using self-injury trauma scale – areas of the brain (R insula and L pre-central gyrus) mediating introceptive behaviours (itch and pain) activated.
Skin picking.....

Best understood as an interaction between a biological vulnerability, physical and psychological factors and environmental circumstances

- Functional analysis - behavioural interventions
- Treatment of co-morbidity (e.g. mood disorder)
- Environmental changes
- Topical treatments to skin
- Medication to modify glutaminergic pathways in the brain??
Abnormal mental state in 18 year old with PWS due to mUPD

- Sudden (over hours) deterioration in his mental state at his group home
  - Confusion (bewildered)
  - Anxious++
  - Unable to talk coherently – referring to ‘blackmail’

- Seen in A/E – Diagnosis confusional state given IV antibiotics
  - Using unrelated words “black, sky, fish”
  - Staring at his hands – grabbing things – hitting staff – saying strange things
  - Staff ‘not using their real names and lying to him’
  - Crawling on hands and news chasing a butterfly that was not there

- Discharged after some improvement, relapsed within hours – liaison psychiatrist diagnosed atypical psychotic illness started on aripiprazole

- Mental state improved over 4 days – two months later remains well on medication.
Prevalence of psychotic and non-psychotic mental illness

- Psychotic symptoms more common in people with mUPD than deletion
- Psychopathology without psychotic symptoms more common in people with deletion than mUPD

Mental illness in people with PWS

• Presents with a deterioration in behaviour and/or the onset of new bizarre behaviours
• Onset usually acute but can also be gradual
• Associated with abnormal mood state and the development of abnormal mental experiences (confusion, hallucinations, delusions)

• Interventions
  – Medication based on diagnosis
  – Reduce demands
  – Consistent informed support
  – Prevent harm
FORMULATION

Challenging behaviour
Emotional (temper) outbursts
Agitation
Self-injury
Etc.

Emotions and feelings
Happy/sad
Relaxed/anxious
Hunger/fullness
Calm/Irritable
Relaxed/Angry
Etc.

Mental state and cognitions
Affective state
Normal and abnormal mental beliefs and experiences
Clouding of consciousness
Etc.

Questions:
How to explain what is observed?
How to intervene in manner that is effective?

Measured

Cognitive ability
Memory,
Executive functioning
Orientation
Etc.

Reported and/or observed

Observed, inferred, and/or assessed

History, mental state and/or physical examination, differential diagnosis, investigation, interventions.
APPROACHES TO FORMULATION & INTERVENTION

Applied Behavioural Analysis (learning theory)
- Predispose
- Precipitate
- Maintain

Bio-medical
- Co-morbidities (physical, psychiatric)
- Biological vulnerabilities

Developmental
- Delayed development
- Behavioural phenotype of PWS
- Social cognition
- Intellectual and cognitive functioning

Systemic
- Quality and nature of support
- PWS informed
- Safe
Mental health and wellbeing

Psychotic illness
Impact of maternally expressed genes
Impaired cognition
Understanding
Response to change
Impaired regulation
Mood, food intake etc
‘Homeostasis’

‘Biological’ interventions
Medications
VNS

Environments
Behaviours reinforced and maintained
Functional analysis
Present environment
Predictability
Food security
Past experiences
Opportunities to learn

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Environmental and psychological interventions
Early intervention
Environmental change
Psychological interventions

Atypical brain development and function

Impact of maternally expressed genes
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mUPD

mUPD

mUPD
COMMENTS
&
QUESTIONS?