



# What is the current evidence base for Key Word Sign

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Website – Google: Key Word Sign Victoria

# Current evidence base

- Supporting the use of Key Word Sign and Gesture and other AAC strategies, with people who have a disability and complex communication needs
- Adult learning styles – effective teaching by/with communication partners
- **Clinical Bottom Line** (distilled information)
- Other areas eg. Baby sign, vocabulary studies

# Research into KWS&G

- “Sign language” has been used with people with intellectual disability since the 1970’s
  - Cornforth, A.R.T., Johnson, K. Walker, M. (1974). Teaching sign language to the deaf mentally handicapped. *Apex*, 2(1), 23-25.
  - Powell, G. (1999). Current research findings to support the use of signs with adults and children who have intellectual and communication difficulties. Retrieved from: <http://www.makaton.org/aboutMakaton/research>
- Shown to be effective across a range of populations and communication outcomes by many researchers since then

# Research into KWS&G

- Body of evidence into use of KWS is growing; as is the emphasis on Evidence Based Clinical Decision Making

## Why does use of KWS work for people with a disability & CCN?

- In people with ID visuo–spatial processing of information is preferred over auditory–verbal processing: use of sign capitalises on area of relative strength (e.g. Broadley, MacDonald & Buckley, 1995; Remington & Clarke, 1996; Schweigert & Rowland, 1998a; 1998b; Miller et al., 1995)
- Signs can ‘last longer’ in time than speech; can be held static as a model to encourage imitation & comprehension
- Visual & tactile-kinaesthetic feedback is available as sign is produced: important for learning, memory and recall (Konstanteras & Leibovitz 1982; Lloyd & Doherty 1983; Kohl , 1981; Dunn 1982).

# Research into KWS&G

- How does use of AAC, including sign, affect speech development?
  - Systematic review with meta-analysis

*“Best level of evidence indicates that AAC interventions do not have a negative impact on speech production”* (Millar, Light & Schlosser, 2006, p. 257)

# Research into KWS&G

Meta-analysis: 16 out of 17 participants (94%) increased speech production during or following at least one AAC intervention (Millar, Light & Schlosser, 2006)

- Of the 6 studies that met inclusion criteria, 5 described unaided (i.e. manual sign) interventions
- Modest positive effects were observed across children and adults ranging from 2 – 60 years
  - Mean increase in number of words was 13 (Range = 1 – 52)
- Some cases had a ‘lag’ before effects of AAC intervention on speech were seen
- Findings support the ‘automatic reinforcement’ theory i.e. *if AAC is presented along with speech and followed by a reinforcer, both AAC use and natural speech should increase in frequency* (Mirenda, 2003)

# Research into KWS&G

- Clinical Bottom Line

Clinicians & parents shouldn't hesitate to introduce AAC interventions to individuals with developmental disabilities if speech is inadequate to meet their communication needs.

Best available evidence suggest AAC interventions benefit development of:

*Communicative Competence*

*Language Skills*

*Speech Production*

Parents & clinicians should be realistic about time frames in which benefits may be seen, and not be too concerned if there is a lag of 6 – 25 sessions before gains are seen.

# Research into KWS & Gesture: A few comments....

- Gesture (with DS)
  - Gesture production is a strength for people with DS, relative to their language skills
  - Children with DS have considerably larger repertoires of gesture than matched peers
  - Gesture is a clinically useful scaffold for children with DS

# Research into KWS & Gesture: A few comments

- Gesture (with ASD)
  - Gesture development of children with autism deviates from normal
  - Difficulties with pointing due to the social-emotional load associated with it
  - Like other children with language impairment though, children with autism can use iconic gestures to augment their communication during conversations
  - Instruction in manual modality may be a useful clinical and education strategy

# Research into KWS&G

- Research shows that children progressively give up the use of sign & gesture as their oral language expands. This applies to:

- **Gesture**

- in typically developing children

(Liszkowski, 2008; Capone & McGregor, 2004)

- **Signing**

- Down Syndrome (Galeote et al. 2011)
  - Intellectual Disability (Vandereet et al. 2011)
  - At risk children (McGregor, 2008)

# Research into KWS&G

- Clinical Bottom Line

**Gesture enhances, not hinders, language development.**

Gesture provides children a means of communicating when the spoken modality is not fully developed.

**Parents and caregivers often need training to recognise and accept gestural communication**

*Experimental* research that demonstrates the effect of gesture use in diagnosis, prognosis & treatment is lacking

# Research into KWS&G

An overview of the effectiveness of KWS and Gesture

## Model of Transdisciplinary Evidence Based Practice

(Adapted: Satterfield et al., 2009)



# Research into KWS&G

- Interest in knowing whether use of KWS and gesture is an effective intervention strategy to enhance communication outcomes for people living with a communication disability i.e. Does it work? Should we use it?
- Is KWS is more or less effective than another form of AAC, for a certain individual or population
- What does the *experimental* published literature say...

# Research into KWS&G

- There are many different types of research designs used in intervention research e.g. Systematic Reviews, Randomized Controlled Trials, Comparative Studies, Case Series, Case Studies
- Whether or not a piece of research is ‘good quality’ and ‘trustworthy’ depends on:
  - Type of research design and the corresponding *Level of Evidence*
  - How well the study has been carried out or its *Methodological Quality*
- Studies mentioned today are from refereed journals

# Research into KWS&G: Levels of evidence

- Systematic review *Highest level*
  - Randomised control trials
  - Cohort studies
  - Case control studies
  - Case studies/case reports
  - Editorials/expert opinion *Lowest level*
- 

Search literature: PICO

# Research into KWS&G

## 1 – Use of sign with people with ID

In people with Intellectual Disability what effect does use of key word sign and gesture have on communication outcomes?

Population (P)	Intervention (I)	Comparison (C)	Outcome (O)
Intellectual Disability OR Learning Disability OR Cognitive Impairment OR Mental Retardation OR Developmental Disability	Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication	Nil	Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social

# State of the evidence

- ❑ High number of cross-sectional exploratory or descriptive studies (e.g. Vandereet et al., 2011)
- ❑ Limited number of experimental studies (intervention studies) (e.g. Van der Meer et al., 2012)
- ❑ Small numbers of participants
- ❑ Inclusion of multiple aetiologies under the heading 'intellectual disability' or 'developmental disability' (e.g. Autism, Down Syndrome, Williams Syndrome, Fragile X Syndrome)

# Clinical Bottom Line

Individuals with intellectual disability / developmental disability can be taught to use various AAC options to enhance communication outcomes.

Speech Generating Device; Picture Exchange Communication Systems; Aided Symbol Systems; Manual Sign

Individuals often demonstrate a preference for one communication mode over another & this is a current research focus

Outcomes are influenced by individual attributes (cognitive, communicative, vocabulary comprehension) and socio-environmental factors

Quality, high level evidence is currently limited

# Representative Literature

Van der Meer, L., Sigafoos, J., O'Reilly, M.F., & Lancioni, G.E (2011). Assessing preferences for AAC options in communication interventions for individuals with developmental disabilities: A review of the literature. *Research in Developmental Disabilities, 32*, 1422 – 1431.

Van der Meer, L., Kagohara, D., Achmadi, D., O'Reilly, M.F., Lancioni, G.E., Sutherland, D., & Sigafoos, J. (2012). Speech-generating devices versus manual signing for children with developmental disabilities. *Research n Developmental Disabilities, 33*, 1658 – 1669.

Vandereet, J., Maes, B., Lembrechts, D., & Zink, I. (2011a). The role of gestures in the transition from one- to two-word speech in a variety of children with intellectual disabilities. *International Journal of Language and Communication Disorders, 46* (6), 714 – 727.

Vandereet, J., Maes, B., Lembrechts, D., & Zink, I. (2011b). Expressive vocabulary acquisition in children with intellectual disability: Speech or manual signs? *Journal of Intellectual & Developmental Disability, 36*(2), 91–104.

Vandereet, J., Maes, B., Lembrechts, D., & Zink, I. (2010). Predicting expressive vocabulary acquisition in children with intellectual disabilities: A 2-year longitudinal study. *Journal of Speech, Language, and Hearing Research, 53*, 1673–1686.

# Research into KWS&G

## 2 – Use of sign with people with Down Syndrome

In people with Down syndrome what effect does use of key word sign and gesture have on communication outcomes?

Population (P)	Intervention (I)	Comparison (C)	Outcome (O)
Down Syndrome OR Trisomy 21	Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication	Nil	Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social OR Conversation

# Effects of a Naturalistic Sign Intervention on Expressive Language of Toddlers With Down Syndrome

- Milieu teaching (KWS environment)
  - 20 sessions 2x/week
    - Joint attention, play, follow child's lead...
- Learned sign
- Increased use of speech
- Generalised to home

Wright, C.A., Kaiser, A. P., Reikowsky, D.I. & Roberts, M.Y. (2013) JSLHR

# Clinical Bottom Line

Receptive comprehension is a relative strength of children with Down Syndrome. Gestural production is also an area of strength.

Galeote et al (2011) showed that the spoken vocabulary of children with DS at the ages of 18 months & 21 months was the same as typically developing children, indicating that there is no general impairment in learning productive (expressive) vocabulary

Similar to typically developing children, in children with DS gestures serve as a 'bridge' between word comprehension & word production; & early gesture use, in association with comprehension, predicts vocabulary development

# Clinical Bottom Line (Cont)

Assessment of symbolic comprehension shows that children with Down Syndrome find gestures significantly easier to understand than miniatures or substitute objects used as abstract symbols to represent other objects, thus supporting use of sign and gesture as a modality for communication input.

As the oral vocabulary of children with DS expands, they progressively give up use of gesture and sign

Use of sign (expressive and receptive) in the early stages of language development can help to improve initial communication and reduce frustration.

# Representative Literature

Galetote, M., Sebastian, E., Checa, E., Rey, R., & Soto, P. (2011). The development of vocabulary in Spanish Children with Down syndrome: Comprehension, production and gestures. *Journal of Intellectual & Developmental Disability, 36* (3), 184 – 196.

Zampini, L., & D'Odorico, L. (2009). Communicative gestures and vocabulary development in 36-month-old children with Down's Syndrome. *International Journal of Language and Communication Disorders, 44* (6), 1063 – 1073.

O'Toole, C., & Chiat, S. (2006). Symbolic functioning and language development in children with Down syndrome. *International Journal of Language and Communication Disorders, 41* (2), 155 – 171.

Iverson, J.M., Longobardi, E., & Caselli, C.M. (2003). Relationship between gestures and words in children with Down's Syndrome and typically developing children in the early stages of communicative development. *International Journal of Language and Communication Disorders, 38* (2), 179 – 197.

# Research into KWS&G

## 3 – Use of sign with people with Autism Spectrum Disorders

In people with autism spectrum disorders what effect does use of key word sign and gesture have on communication outcomes?

Population (P)	Intervention (I)	Comparison (C)	Outcome (O)
Autism OR Autism Spectrum Disorder OR ASD OR Asperger's Syndrome OR Developmental Disability	Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication	Nil	Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social OR Conversation

# Acquisition and generalization of key word signing by three children with autism

- Milieu teaching (Creating a KWS environment) core/interactive vocabulary
- Acquired signs & generalised core signs
- Speech – neutral to increased word use

Tan, X., Trembath, D., Bloomberg, K., Iacono, T. & Caithness, T. (2014) Developmental Neuro-rehabilitation.

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# Clinical Bottom Line

**“Emerging” evidence based intervention for people with ASD**

Use of gesture to support imitation based training methods & receptive language instruction may be helpful

Studies show that gesture & speech are not always effectively integrated during social communication in people with autism - consider sequential rather than simultaneous presentation of speech & gesture / sign

Children with autism use significantly less gestures in early development than TD peers or those with other types of DD – this has implications for early autism screening, assessment & intervention

# Clinical Bottom Line (Cont)

Using signs can provide effective communication options for students with autism

Signing does not impact negatively on speech production & generally has a positive though modest impact on speech production

It is becoming clear that individual differences among children with autism may mean a preference for, & greater success with, one type of communication compared with another & individual differences should be taken into account when choosing & designing communication systems.

# Representative Literature

Falcomata, T.S., Wacker, D.P., Ringdahl, J.E., Vinqust, K., & Dutt, A. (2013). An evaluation of generalization of mands during functional communication training. *Journal of Applied Behaviour Analysis, 46* (2), 444 – 454.

Watson, L., Crais, E.R., Baranek, G.T., Dykstra, J.R., & Wilson, K. P. (2013). Communicative gesture use in infants with and without autism: A Retrospective home video study. *American Journal of Speech-Language Pathology, 22*, 25 – 39.

Van-der Meer, L., Didden, R., Sutherland, D., O'Reilly, M.F., Lancioni, G.E., & Sigafos, J. (2012). Comparing three augmentative and alternative communication modes for children with developmental disabilities. *Journal of Developmental and Physical Disability, 24*, 451 – 468. DOI 10.1007/s10882-012-9283-3

Wong, V.C.N., & Kwan, Q.K. (2010). Randomized controlled trial for early intervention for autism: A pilot study of the autism 1-2-3 Project. *Journal of Autism and Developmental Disorders, 40*, 677 – 688. DOI 10.1007/s10803-009-0916-z

# Representative Literature (cont)

Hubbard, A.L., McNealy, K., Scott-Van Zeeland, A.A., Callan, D.E., Bookheimers, S.Y., & Dapreto, M. (2012). Altered integration of speech and gesture in children with autism spectrum disorders. *Brain and Behavior, 2* (5), 606–619. doi: 10.1002/brb3.81

Ingersoll, B., & Lalonde, K. (2010). The impact of object and gesture imitation training on language use in children with autism spectrum disorder. *Journal of Speech, Language and Hearing Research, 53*, 1040 – 1051.

Brunner, D.L. & Seung, H. (2009). Evaluation of the Efficacy of Communication-Based Treatments for Autism Spectrum Disorders: A Literature Review. *Communication Disorders Quarterly, 3*(1), 15-41.

Wendt, O. (2009). Research on the use of manual signs and graphic symbols in autism spectrum disorders: A systematic review. In P. Mirenda & T. Iacono (Eds). *Autism spectrum disorders and AAC*. Baltimore: Paul H. Brookes.

# Research into KWS&G

## 4 – Use of sign with people with Physical Disability

In people with physical disability such as cerebral palsy what effect does use of key word sign and gesture have on communication outcomes?

Population (P)	Intervention (I)	Comparison (C)	Outcome (O)
Physical Disability OR Cerebral Palsy OR Motor Impairment OR Mobility Impairment	Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication	Nil	Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social OR Conversation

# Clinical Bottom Line

Early studies unable to demonstrate any benefit of the use of manual sign in people with cerebral palsy when compared to other form of AAC e.g. symbols, SGDs

Ability to use & preference for different forms of AAC vary greatly across individuals & therefore functional, ecological assessment of communication needs, including communication partners, is essential

Multimodal communication is common in people with CP

Use of aided & unaided speech supplementation cues can improve perceived intelligibility of dysarthric speech in people with gross motor impairment

# Representative Literature

Blischak, D.M., & Lloyd, L. (1996). Multimodal augmentative and alternative communication: Case Study. *Augmentative and Alternative Communication*, 12, 37 – 46.

Hustad, K.C., & Mertz Garcia, J. (2005). Aided and Unaided Speech Supplementation Strategies: Effect of Alphabet Cues and Iconic Hand Gestures on Dysarthric Speech. *Journal of Speech, Language and Hearing Research*, 48, 996 – 1012.

Udwin, O., Yule, W. (1990). Augmentative communication systems taught to cerebral palsied children - a longitudinal study. 1. The acquisition of signs and symbols and syntactic aspects of their use over time. *British Journal of Disorders of Communication*, 25, 295 – 309.

# Creating a Sign Environment

- A good language environment requires language models  
(Von Tetzchner, 2000)
- Consistent signing from partners  
(Spragale & Micucci, 1990)
- Functional vocabulary (Loeding et al. 1990)
- “Sign teaching needs to be embedded in a creative approach to communication which encourages peer interaction and incorporates functional goals.”  
(Grove & McDougall 1991)
- Parallel with aided (ALS) approaches  
(Bloom & Treloar, 1997; Goossens, Crain & Elder 1992)

# Early Childhood Teacher training in KWS

- Basic workshop (4 modules) (N = 196)
- Better understanding of & engagement with AAC ability to incorporate KWS into range of everyday learning experiences = modelling KWS environment
- reported KWS important for communication development - comprehension & expression
- facilitates inclusion
  - reduced barriers, aids participation; allows individual learning styles (multi-modal & multi-sensory), + visual supports

Iacono, T. & Cologon, K. (in press),

# Clinical Bottom Line

Majority of workshop participants are highly enthusiastic about workshops; participation rates are high

Participants in KWS workshops show a significant difference in recognition and production of signs pre and post workshop; gains are not maintained beyond 6 weeks

Staff who have received training in KWS use significantly more sign than untrained staff

While use of sign and gesture significantly changes following a formal training, accompanying change in use of language, MLU, pragmatic functions is not seen in communication partners

# Clinical Bottom Line

People with disabilities sign more when communication partners sign to them & respond to sign attempts

To facilitate ongoing use & development of sign the partner needs to know as many if not more signs than the person they are communicating with (modelling & teaching)

In an organisational setting, the following factors contribute to establishing a signing environment:

*Support from management; provision of training in a way that gives knowledge, practice & support in 'real' situations; development of centre-wide policies on signing & communication; involvement of all staff members in determining needs & direction of projects; address staffs underlying beliefs & attitudes to change their signing behaviour ; flexibility in the signing system*

# Representative Literature

Chadwick D & Joliffe J (2009), 'A pilot investigation into the efficacy of a signing training strategy for staff working with adults with intellectual disabilities' *British Journal of Learning Disabilities* 37:1 pp. 34-42

C.Torrison, E.Jung, K. Baker, C.Beliveau and A.Cook, (2007). The impact of staff training in Alternative/Augmentative Communication (AAC) on the communication abilities of adults with developmental disabilities. *Developmental Disabilities Bulletin*, 35 (1&2), 103-130.

Wing Chee So., Colin Sim., Chen-Hui., & Julie Low Wei-Shan. (2012) Mnemonic effect of iconic gesture and beat gesture in adults and children: Is meaning in gesture important for memory recall? *Language and Cognitive Processes*, 27 (5), 665-681, DOI:10.1080/01690965.2011.573220