

# Functional changes through the usage of 3D-printed transitional prostheses in children

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**Introduction:** There is limited knowledge on the use of 3 D-printed transitional prostheses, as they relate to changes in function and strength. Therefore, the purpose of this study was to identify functional and strength changes after usage of 3 D-printed transitional prostheses for multiple weeks for children with upper-limb differences. **Materials and methods:** Gross manual dexterity was assessed using the Box and Block Test and wrist strength was measured using a dynamometer. This testing was conducted before and after a period of  $24 \pm 2.61$  weeks of using a 3 D-printed transitional prosthesis. The 11 children (five girls and six boys; 3-15 years of age) who participated in the study, were fitted with a 3 D-printed transitional partial hand ( $n = 9$ ) or an arm ( $n = 2$ ) prosthesis. **Results:** Separate two-way repeated measures ANOVAs were performed to analyze function and strength data. There was a significant hand by time interaction for function, but not for strength. **Conclusion and relevance to the study of disability and rehabilitation:** The increase in manual gross dexterity suggests that the Cyborg Beast 2 3 D-printed prosthesis can be used as a transitional device to improve function in children with traumatic or congenital upper-limb differences. **Implications for Rehabilitation** Children's prosthetic needs are complex due to their small size, rapid growth, and psychosocial development. Advancements in computer-aided design and additive manufacturing offer the possibility of designing and printing transitional prostheses at a very low cost, but there is limited knowledge on the function of this type of devices. The use of 3D

printed transitional prostheses may improve manual gross dexterity in children after several weeks of using it. © 2017, © 2017 Informa UK Limited, trading as Taylor & Francis Group.

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arm

biomechanics

computer-aided design

custom-made prostheses

hand

motor control

paediatric

reaching

daily life activity

female

handicapped child

human

limb prosthesis

male

preschool child

prosthesis design

rehabilitation

three dimensional printing

upper limb

Activities of Daily Living

Artificial Limbs

Child, Preschool

Disabled Children

Female

Humans

Male

Printing, Three-Dimensional

Prosthesis Design

Upper Extremity