Attachment I

Form Approved
OMB No.: 0920-xxxx
Expiration Date: XX/XX/XXXX

Seat Belt Fit and anthropometric Measurements

Thank you for coming in today. Your child is being asked to participate in a study to update the rules for booster seat and seat belt use in children ages 6-12. If you agree to allow your child to participate, I will ask you to sign an Informed Consent Form that we will go over in a moment. I will also ask your child if he/she would like to participate in the study as well. If he/she also agrees to participate, I will review the Informed Assent Form with your child and have him/her sign the form as well.

During the study, the following measurements will be collected from your child:

- Standing and sitting height,
- Upper and lower leg length,
- Shoulder height and width,
- Chest circumference,
- Waist circumference,
- Hip width, and
- His or her weight.

We will also be taking measurements while your child sits in different seating positions in three different vehicles to help us see how well the seat belt fits. In order to take the measurements, our researchers will have physical contact with your child. For example, to measure the seat belt fit we will need to measure the location of the hipbone and the shoulder, which will require a researcher to feel for the appropriate locations. All child participants will be measured in front of their parents.

To better help collect these measurements your child has been provided a uniform consisting of a cotton t-shirt and pants. The clothing items provided will help us to get a more accurate measurement.

You will be asked to be present at all times. The entire session will take up to 2 hours to complete. We will be videotaping and taking photographs to help with writing a report of our findings. As part of the informed consent process you will also need to give us permission to videotape and photograph your child while they are participating in this study.

Is it O.K. if we proceed to reviewing the Informed Consent/Assent forms?

Wait for parent to indicate that it is OK to proceed, and then move on to reading the Informed Consent to them.

Anthropometric Measures Anthropometric Measures

Item	Variable Name	Label	Format	Description	Body Position During Measurement	Units of Measurement	Crosswalk Page #
1	ChildID	Child ID		Unique ID assigned to the child participant.	NA	NA	3
2	CollectionDate	Collection Date		The date when the participant was measured.	NA	M/DD/YYYY	3
3	antWeight	Measured Weight	Decimal	Measurement of the child participants' weight while standing using a digital scale. **See Weight protocol for specifics.**	Standing	kg	3
4	antStandingHeight	Standing Height	Decimal	A measure of total skeletal length obtained when the child participant is standing. **See Standing Height protocol for measurement specifics.**	Standing	mm	3
5	BMI	Body Mass Index	Decimal	A calculation of body fat based on height and weight (from 12-36). **See BMI protocol for specifics.**	Standing	kg/m^2	3
6	BMICategory	Body Mass Category	Text	A categorization of the BMI value. Categories correspond to < 18.5, 18.5 - 24.9, 25-29.9, and >30, respectively.	NA	Underweight, Normal, Overweight, or Obese	3
7	ChestCircum	Chest Circumference	Decimal	Chest circumference will be measured using a flexible ruler circumnavigating the chest just below the armpits with the arms hanging downward along the abdomen.	Standing	mm	3
8	HipCircum	Waist Circumference	Decimal	Waist circumference will be measured using a flexible ruler circumnavigating the waist just above the ASIS.	Standing	mm	3
9	ESittingHeight	Erect Sitting Height	Decimal	A measure of the child participants' sitting height measured from the crown of the head to the base upon which the participant is sitting. **See Sitting Height protocol for specifics.**	Sitting	mm	4
10	SittingShoulderHeight	Sitting Shoulder Height	Decimal	A measure of the distance from the seating surface to the most level spot on the top of the shoulder.	Sitting	mm	4
11	SittingKneeHeight	Sitting Knee Height	Decimal	Measurement of the child participants' lower leg, from the popliteal fossa behind the knee to the bottom of the heel. During this measurement the participants' legs are fully extended with feet resting on the floor and the knees and ankles at a 90 degree angles. **See Knee Height protocol for specifics.**	Sitting	mm	4
12	LumbarSpineFlex	Lumbar Spine Flexion	Decimal	Baseline value is calculated as the distance between the head CG and the hip CG when in an erect sitting position (Reed, 2008; Reed, 2006). Slouch is measured as the shift in this distance.	Sitting	mm	4
13	SittingShoulderWidth	Sitting Shoulder Width	Decimal	Measurement of the widest part of the child participants' shoulder width when in the seating position. During this measurement the child will sit with their back to a flat and vertical surface. **See Sitting Shoulder Width protocol for specifics.**	Sitting	mm	4
14	SittingHipWidth	Sitting Hip Width	Decimal	Measurement of the widest part of the child participants hip width when in the seating position. **See Sitting Hip Width protocol for specifics.**	Sitting	mm	4
15	BPL	Buttock-popliteal length	Decimal	Measured horizontally from a vertical plane tangent to buttocks to the popliteal fossa behind the knee with child in a standardized erect sitting position (see Bilston, 2007; Huang, 2006).	Sitting	mm	4
16	ID	ID	Text	A field populated automatically by MS Access with an unique sequential number associated with each record.	NA	1- n	N/A
17	HeadCG	Head CG	3D Coordinate	The 3-dimensional coordinate that estimates the center of gravity of the subject's head (Reed, 2006).	Sitting	mm	4
18	HipCG	Hip CG	3D Coordinate	The 3-dimensional coordinate that estimates the center of gravity of the subject's hips (Reed, 2008;	Sitting	mm	4

Child Vehicle Seat/Booster Seat Fit

Variable Name	Label	Format	Description	Units of Measurement	Crosswalk Page #
ID	ID	Integer	A field populated automatically by MS Access with an unique sequential number associated with each record.	1 - n	N/A
VehicleID	Vehicle ID	Text	A unique ID assigned to the vehicle.		11
ChildID	Child ID		Unique ID assigned to the child participant.	NA	11
BoosterID	Booster ID	Text	A unique ID assigned to the booster seat. In addition to the boosters, a None value will be used to identify the measures associated with having no booster in the ChildVehicleBoosterFit table.		11
UpperLegAngle	Upper Leg Angle	Decimal	The angle of the thigh relative to horizontal. Measured with an inclinometer.	Degrees	11
LowerLegAngle	Lower Leg Angle	Decimal	The angle of the shin relative to horizontal. Measured with an inclinometer.	Degrees	11
HeelLocation	Heel Location	3D Coordinate	The location of the bottom center of the heel bone.* This can be used in conjunction with FloorLocation to calculate an offset distance.	mm	11
HipCG	HipCG	3D Coordinate	Digitized location of the center of gravity of the hips.* (Reed, 2008; Reed, 2006).	mm	11
HeadCG	Head CG	3D Coordinate	Digitized location of the point approximating the center of gravity of the head.* (Reed, 2006)	mm	11
Slouch	Slouch	Decimal	Distance from the Head CG to the Hip CG.* (Reed, 2008; Reed, 2006) The child's posture in the seat, usually judged from the pelvis angle and the space between the [booster] seat back and the child's buttocks. This measure would be compared to the similar measure (Lumbar Spine Flexion) made during the anthropometry measurements as a baseline.	mm	11
InShoulderBeltPosition	Inboard Shoulder Belt Position	3D Coordinate	Digitized location of the inboard edge of shoulder belt on chest at height of suprasternal landmark. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008).* This is used to calculate the centerpoint of the belt where it crosses the clavicle.	mm	12
OutShoulderBeltPosition	Outboard Shoulder Belt Position	3D Coordinate	Digitized location of the outboard edge of shoulder belt on chest at height of suprasternal landmark. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008).* This is used to calculate the centerpoint of the belt where it crosses the clavicle.	mm	12
Suprasternal	Suprasternal Landmark	3D Coordinate	Digitized location of the suprasternal landmark. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008).* This is used to calculate the centerpoint of the shoulder, along the clavicle, where the shoulder belt crosses it.	mm	12
Acromion	Acromion Landmark	3D Coordinate	Digitized location of the acromion landmark. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008).* This is used to calculate the centerpoint of the shoulder, along the clavicle, where the shoulder belt crosses it.	mm	12
UpperLLapBeltPosition	Upper Left Lap Belt Position	3D Coordinate	FARO arm to digitize upper/lower edges of lap belt on pelvis with respect to ASIS. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008) The position of the lap belt relative to the abdomen, pelvis, and thighs	mm	12
UpperRLapBeltPosition	Upper Right Lap Belt Position	3D Coordinate	FARO arm to digitize upper/lower edges of lap belt on pelvis with respect to ASIS. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008)	mm	12
LowerLLapBeltPosition	Lower Left Lap Belt Position	3D Coordinate	FARO arm to digitize upper/lower edges of lap belt on pelvis with respect to ASIS. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008) The position of the lap belt relative to the abdomen, pelvis, and thighs	mm	12
LowerRLapBeltPosition	Lower Right Lap Belt Position	3D Coordinate	FARO arm to digitize upper/lower edges of lap belt on pelvis with respect to ASIS. (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008)	mm	12
LeftASIS	Left ASIS	3D Coordinate	Digitized location of the ASIS on the left side of the participant's hip.* (Reed, 2008)	mm	12
RightASIS	Right ASIS	3D Coordinate	Digitized location of the ASIS on the right side of the hip.* (Reed, 2008)	mm	12
SBeltXZAngle	Shoulder Belt XZ Angle	Decimal	Shoulder belt side-view XZ angle with respect to H-point (Reed, 2013; Reed, 2009; Reed, 2008;	Degrees	12
SBeltYZAngle	Shoulder Belt YZ Angle	Decimal	Shoulder belt front-view YZ angle with respect to H-point (Reed, 2013; Reed, 2009; Reed, 2008;	Degrees	12
LBeltXZAngle	Lap Belt XZ Angle	Decimal	Lap belt side-view XZ angle with respect to H-point (Reed, 2013; Reed, 2009; Reed, 2011; Reed, 2008;	Degrees	12

Child comfort questions

Item	Variable Name	Label	Format	Description	Units of Measurement
1	ID	ID	Integer	A field populated automatically by MS Access with an unique sequential number associated with each record.	1 - n
2	ChildID	Child ID		Unique ID assigned to the child participant.	NA
3	ComfortHighbackBooster	Comfort In Highback Booster	Text	Child's perception of comfort while in each seat type. Does how you are sitting / or does your booster seat / or does the seat belt feel uncomfortable? If Yes, where do child feel uncomfortable "On this picture show me what part of your body is uncomfortable." A. Why? Specify Answer: B. On a scale of 1-5 with 1 being a little uncomfortable and 5 being very uncomfortable how uncomfortable is the seat belt rubbing on your ____ (insert body part)? C. Is there anywhere else that you feel uncomfortable? If yes repeat above. If no move on.	
4	ComfortBacklessBooster	Comfort In Backless Booster	Text	Child's perception of comfort while in each seat type. Does how you are sitting / or does your booster seat / or does the seat belt feel uncomfortable? If Yes, where do child feel uncomfortable "On this picture show me what part of your body is uncomfortable." A. Why? Specify Answer: B. On a scale of 1-5 with 1 being a little uncomfortable and 5 being very uncomfortable how uncomfortable is the seat belt rubbing on your ____ (insert body part)? C. Is there anywhere else that you feel uncomfortable? If yes repeat above. If no move on.	
5	ComfortSeatBeltOnly	Comfort In Seat Belt Only	Text	Child's perception of comfort while in each seat type. Does how you are sitting / or does your booster seat / or does the seat belt feel uncomfortable? If Yes, where do child feel uncomfortable "On this picture show me what part of your body is uncomfortable." A. Why? Specify Answer: B. On a scale of 1-5 with 1 being a little uncomfortable and 5 being very uncomfortable how uncomfortable is the seat belt rubbing on your ____ (insert body part)? C. Is there anywhere else that you feel uncomfortable? If yes repeat above. If no move on.	
12	SafestSeat	Safest Seat	Text	Child's perception of safest seat type. And why?	Highback Booster, Backless Booster, Seat Belt only, or None
13	LeastSafestSeat	Least Safest Seat	Text	Child's perception of least safe seat type. And why?	Highback Booster, Backless Booster, Seat Belt only, or None
14	SeatTypeMostComfortable	Seat Type Most Comfortable	Text	Child's perception of most comfortable seat type. And why?	Highback Booster, Backless Booster, Seat Belt only, or None
15	SeatTypeMostUnomfortable	Seat Type Most Uncomfortable	Text	Child's perception of most uncomfortable seat type. And why?	Highback Booster, Backless Booster, Seat Belt only, or None

Qualitative Fit Assessment by Researcher

Item	Variable Name	Label	Format	Description	Units of Measurement	Crosswalk Page #
1	ID	ID	Integer	A field populated automatically by MS Access with an unique sequential number associated with each record.	1 - n	N/A
2	VehicleID	Vehicle ID	Text	A unique ID assigned to the vehicle.		13
3	ChildID	Child ID		Unique ID assigned to the child participant.	NA	13
4	BoosterID	Booster ID	Text	A unique ID assigned to the booster seat. In addition to the boosters, a None value will be used to identify the measures associated with having no booster in the ChildVehicleBoosterFit table.		13
5	Slouch	Slouch	Text	The child's posture in the seat, usually judged from the pelvis angle and the space between the [booster] seat back and the child's buttocks.	Sitting Up Straight, Almost Straight, Slightly Slouched, or Extremely	13
6	ShoulderBeltSnugness	Shoulder Belt Snugness	Text	The qualitative snugness of the shoulder belt as adjusted by the participant.	Little Slack, Snug Against, Clothing, Compressing Skin, or Very Tight	13
7	ShoulderBeltPosition	Shoulder Belt Position	Text	The position of the shoulder belt relative to the arm, shoulder, and face.	Against Neck, On Shoulder But Close To Neck, Centered On Shoulder, On Shoulder But Close To Arm, or Over	13
8	LapBeltSnugness	Lap Belt Snugness	Text	The qualitative snugness of the lap belt as adjusted by the participant.	Little Slack, Snug Against, Clothing, Compressing Skin, or Very Tight	13
9	LapBeltPosition	Lap Belt Position	Text	The position of the lap belt relative to the ASIS.	Flat Over Legs, Low Over Pelvis, Over Pelvis, Over Abdomen, or Approaching Ribcage	13
10	BoosterFit	Booster Fit	Integer	The fit of a child in a given booster. Extent of shoulder target coverage was noted for some.	1 - 5 scale Where 1 is comfortable fit and 5 is the child is too large to physically fit in the booster.	13
11	Time2Engage	Time To Engage	Decimal	The amount of time required for the participant to climb into the seat, route the belt, and buckle it from a starting point outside the vehicle.	Seconds	13
12	Difficulty2Engage	Difficulty To Engage	Text	Qualitative assessment of the difficulty of routing the belt and buckling.	Easy, Doable, Difficult, or Impossible Without Assistance	13
13	ThighAngleCat	Thigh Angle Category	Text	Categorical measure of thigh angle relative to horizontal.	Significantly Above Horizontal, Slightly Above Horizontal, Horizontal, Slightly Below Horizontal, or Significantly Below Horizontal	13
14	ShinAngleCat	Shin Angle Category	Text	Categorical measure of shin angle relative to vertical.	Vertical, Nearly Vertical, About 45, Nearly Horizontal, Horizontal	13
15	FootPosnCat	Foot Position Category	Text	Categorical measure of the foot position relative to the seat.	On Floor, Almost On Floor, Hanging Over Seat, Parallel To Seat, or On Seat	13
16	SittingHeightCat	Sitting Height Category	Text	Location of the child's head relative to the top of the rear vehicle seat.	Entire Head Below Seat, Ears Along Seat, Ears Above Seat, Chin Above Seat, or Head Almost Touching Roof	13
17	CPSTShoulderPosition	Belt crosses shoulder & neck?	Text	Does the shoulder belt cross between child’s shoulder and neck?	Yes or No	13
18	CPSTBack2Seat	Back is against vehicle seat?	Text	Is the child’s lower back against the vehicle seat?	Yes or No	13
19	CPSTLaponThighs	Lap belt crosses thighs?	Text	Is the lap belt on child’s thighs?	Yes or No	13
20	CPSTKneesBent	Knees bend at seat edge?	Text	Do the child’s knees bend at the end of seat?	Yes or No	13
21	CPSTShoulderFitOK	Good fit w/ just shoulder belt?	Text	Overall, does the shoulder belt properly fit the child? / OR/ As a CPS tech, would you say this child has good shoulder belt fit using just the seat belt?	Yes or No	13
22	CPSTLapFitOK	Good fit w/ just lap belt?	Text	Overall, does the lap belt properly fit the child? / OR/ As a CPS tech, would you say this child has good lap belt fit using just the seat belt?	Yes or No	13
23	CPSTOverallBeltFitOK	Recommend just using belt?	Text	Overall, does the seat belt properly fit the child? / OR/ As a CPS tech, would you recommend this child to just use a seat belt?	Yes or No	13