# Limiting Factors to Participation in USA Ultimate in Comparison to US Lacrosse

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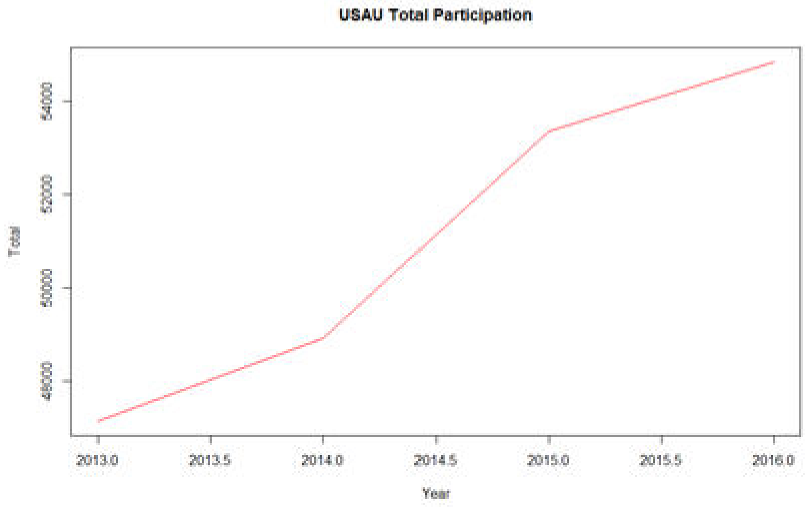
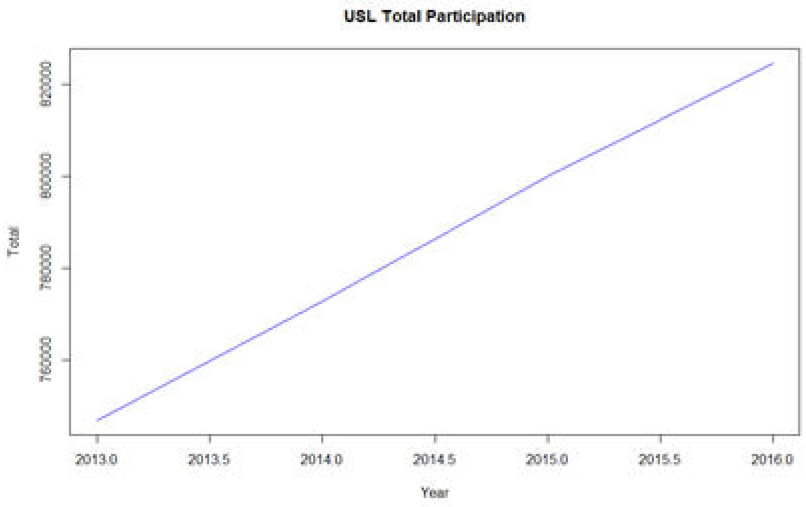
# What is Ultimate?

# Growth Rate of Ultimate vs Lacrosse

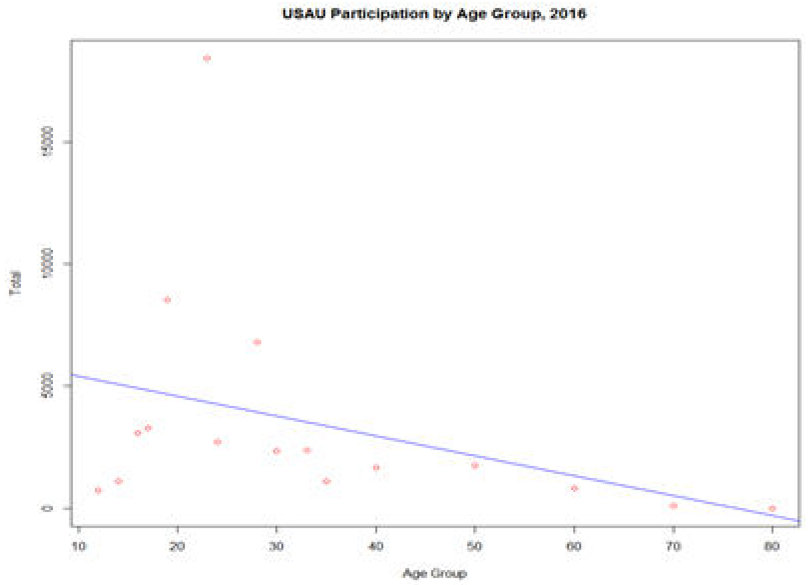


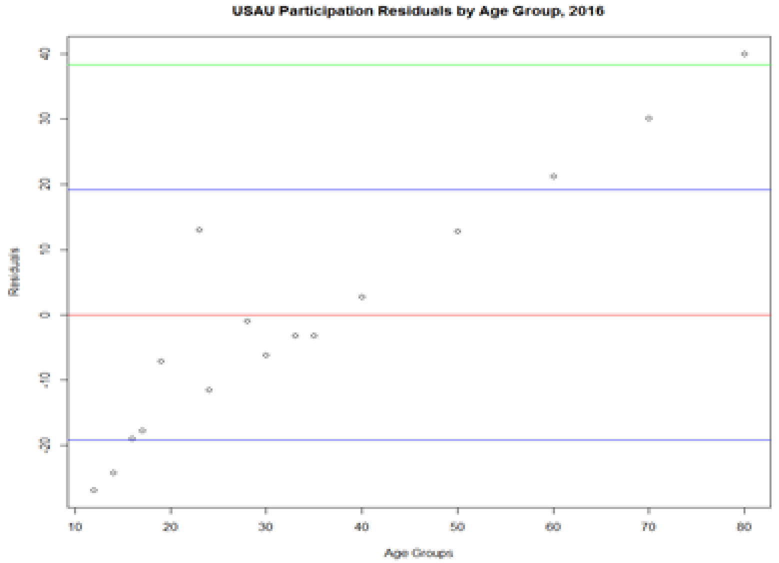




Growth Rate: 16.35835%

Growth Rate: 10.40598%

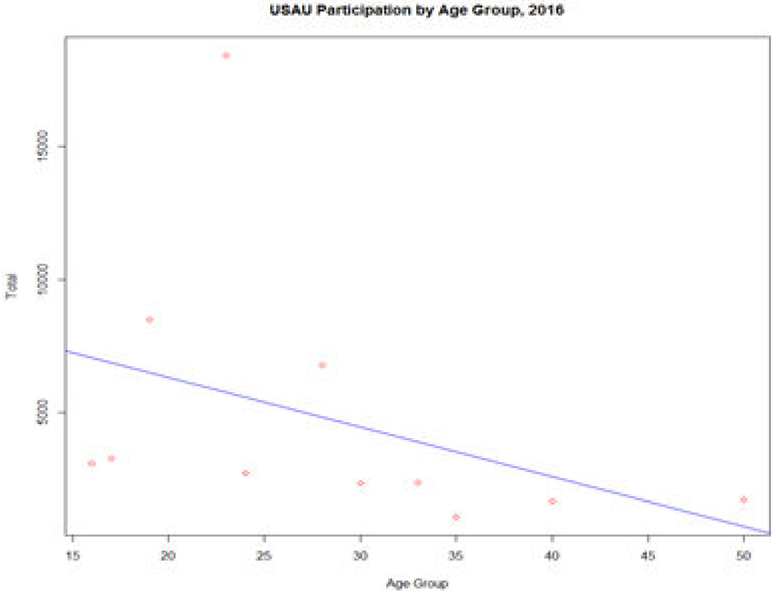
# Why does participation differ between age groups?

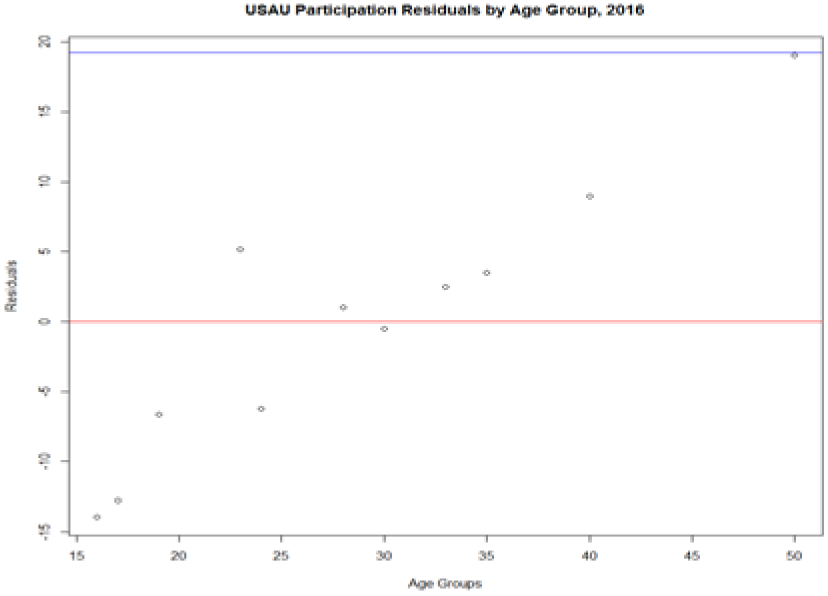



R: 0.26627053911

# No Outliers




R: 0.22908513701

# How can Ultimate’s participation be increased

## <u>Make it an Interscholastic Sport!</u>

# Appendix

```
years <- c(2013, 2014, 2015, 2016)

USAU.totals <- c(47138, 48914, 53362, 54849)
USAU.youth <- c(703, 781, 1407, 1705)
USAU.high <- c(11913, 12983, 14180, 14875)
USAU.college <- c(16755, 17036, 18173, 18415)
USAU.post <- c(17418, 17807, 18956, 17222)

USL.totals <- c(746859, 772772, 799874, 824577)
USL.youth <- c(403770, 424836, 444580, 454527)
USL.high <- c(290046, 297238, 305122, 315877)
USL.college <- c(36515, 38383, 38383, 42384)
USL.post <- c(16288, 12075, 11789, 11789)

year1 <- c(703, 11913, 16755, 17418)
year2 <- c(781, 12983, 17036, 17807)
year3 <- c(1407, 14180, 18173, 18956)
year4 <- c(1705, 14875, 18415, 17222)
# Line Graphs
plot(years, USAU.totals, type="l", col="red", main="USAU Total Participation", xlab="Year", ylab="Total")
plot(years, USL.totals, type="l", col="blue", main="USL Total Participation", xlab="Year", ylab="Total")

# Growth
cat("USAU Total Growth: ", ((54849-47138)/47138)*100, "%\n")
cat("USL Total Growth: ", ((824577-746859)/746859)*100, "%\n\n")

# Youth Participation
# Line Graphs
plot(years, USAU.youth, type="l", col="red", main="USAU Youth Participation", xlab="Year", ylab="Total")
plot(years, USL.youth, type="l", col="blue", main="USL Youth Participation", xlab="Year", ylab="Total")
```

# Appendix

```
# Linear Regression
# Original
totals.per.year <- cbind(USAU.2016.totals, USAU.2016.categories)
plot(x=USAU.2016.categories, y=USAU.2016.totals, col="red", main="USAU Participation by Age Group, 2016", xlab="Age Group", ylab="Total")
abline(lm(USAU.2016.totals~USAU.2016.categories), col="blue")
Cor <- cor(USAU.2016.totals,USAU.2016.categories)
print(Cor)

LinMod <- lm(USAU.2016.categories~USAU.2016.totals)
print(summary(LinMod))


LinMod.res <- resid(LinMod)
plot(y=LinMod.res, x=USAU.2016.categories, ylab="Residuals", xlab="Age Groups", main="USAU Participation Residuals by Age Group, 2016")
abline(0, 0, col="red")
abline(sd(LinMod.res), 0, col="blue") # 1 standard deviation above 0
abline(-sd(LinMod.res), 0, col="blue") # 1 standard deviation below 0
abline(2*sd(LinMod.res), 0, col="green") # 2 standard deviations above 0
abline(-2*sd(LinMod.res), 0, col="green") # 2 standard deviations below 0

#Removing outliers
USAU.2016.totals.fixed <- c(3090, 3269, 8516, 18415, 2725, 6797, 2335, 2366, 1103, 1676, 1741)
USAU.2016.categories.fixed <- c(16, 17, 19, 23, 24, 28, 30, 33, 35, 40, 50)

totals.per.year.fixed <- cbind(USAU.2016.totals.fixed, USAU.2016.categories.fixed)
plot(x=USAU.2016.categories.fixed, y=USAU.2016.totals.fixed, col="red", main="USAU Participation by Age Group, 2016", xlab="Age Group", ylab="Total")
abline(lm(USAU.2016.totals.fixed~USAU.2016.categories.fixed), col="blue")

Cor2 <- cor(USAU.2016.totals.fixed,USAU.2016.categories.fixed)
print(Cor2)

LinMod2 <- lm(USAU.2016.categories.fixed~USAU.2016.totals.fixed)
print(summary(LinMod2))
LinMod2.res <- resid(LinMod2)
plot(y=LinMod2.res, x=USAU.2016.categories.fixed, ylab="Residuals", xlab="Age Groups", main="USAU Participation Residuals by Age Group, 2016")
abline(0, 0, col="red")
abline(sd(LinMod.res), 0, col="blue") # 1 standard deviation above 0
abline(-sd(LinMod.res), 0, col="blue") # 1 standard deviation below 0
abline(2*sd(LinMod.res), 0, col="green") # 2 standard deviations above 0
abline(-2*sd(LinMod.res), 0, col="green") # 2 standard deviations below 0
```