

Result

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All bayesian gemtc

```
load("df_indirect_BNMA.RData")
load("df_direct_BNMA.RData")
load("df_overall_BNMA.RData")

# power in indirect evidence

png('indirect_power.png', width = 800, height = 400)

gridExtra::grid.arrange(

df_indirect_new %>% filter(k_ab == 6, pi_a == 0.1) %>%
  ggplot(aes(x = k_ac, y = power, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = power)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 6$ ,  $\pi_A = 0.1$ "), color = 'red')
,
df_indirect_new %>% filter(k_ab == 12, pi_a == 0.1) %>%
  ggplot(aes(x = k_ac, y = power, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = power)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 12$ ,  $\pi_A = 0.1$ "), color = 'red')
,
df_indirect_new %>% filter(k_ab == 6, pi_a == 0.5) %>%
  ggplot(aes(x = k_ac, y = power, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = power)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 6$ ,  $\pi_A = 0.5$ "), color = 'red')
,
df_indirect_new %>% filter(k_ab == 12, pi_a == 0.5) %>%
  ggplot(aes(x = k_ac, y = power, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = power)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 12$ ,  $\pi_A = 0.5$ "), color = 'red')
)

dev.off()

## pdf
## 2

# ranking correct in indirect evidence

png('indirect_rank.png', width = 800, height = 400)
```

```

gridExtra::grid.arrange(

df_indirect_new %>% filter(k_ab == 6, pi_a == 0.1) %>%
  ggplot(aes(x = k_ac, y = rank_correct, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = 0.1)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 6$ ,  $\pi_A = 0.1$ "), color = "black")
,
df_indirect_new %>% filter(k_ab == 12, pi_a == 0.1) %>%
  ggplot(aes(x = k_ac, y = rank_correct, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = 0.1)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 12$ ,  $\pi_A = 0.1$ "), color = "black")
,

df_indirect_new %>% filter(k_ab == 6, pi_a == 0.5) %>%
  ggplot(aes(x = k_ac, y = rank_correct, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = 0.5)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 6$ ,  $\pi_A = 0.5$ "), color = "black")
,
df_indirect_new %>% filter(k_ab == 12, pi_a == 0.5) %>%
  ggplot(aes(x = k_ac, y = rank_correct, color = factor(OR_bc))) + geom_hline(size = 1.2, aes(yintercept = 0.5)) +
  facet_wrap(~tau) + labs(title = TeX("Indirect Evidence:  $k_{AB} = k_{AC} = 12$ ,  $\pi_A = 0.5$ "), color = "black")
)

dev.off()

```

```

## pdf
## 2

```

Power Direct

```

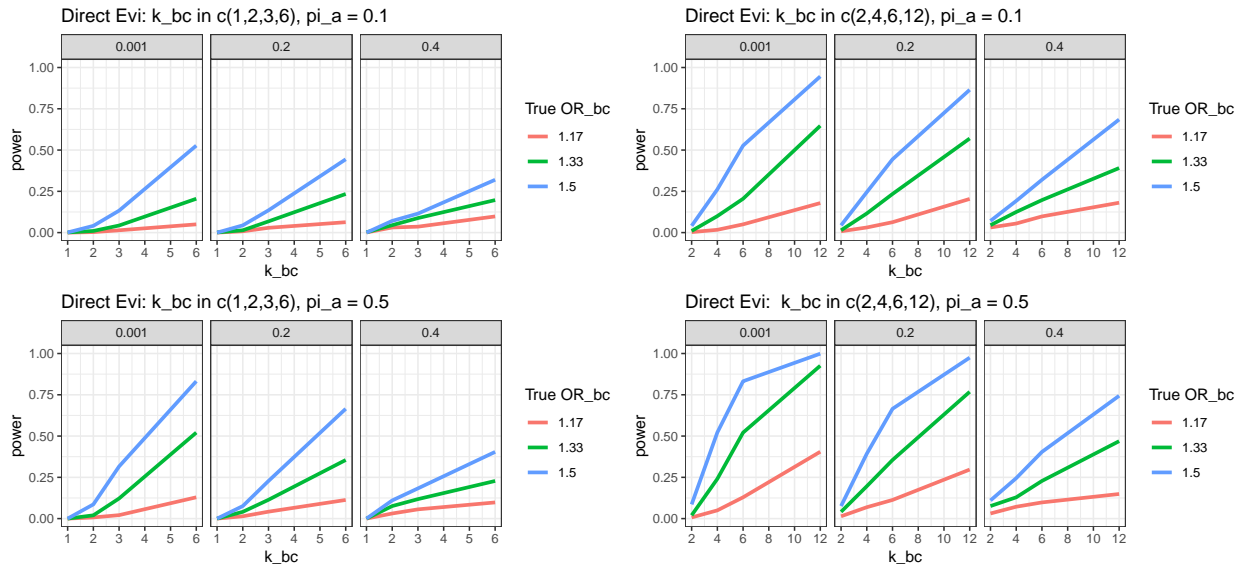
gridExtra::grid.arrange(

df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.1) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi:  $k_{bc}$  in c(1,2,3,6),  $\pi_a = 0.1$ ", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(1, 6, 1), labels = as.character(seq(1, 6, 1))) + ylim(0,1)
,
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.1) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi:  $k_{bc}$  in c(2,4,6,12),  $\pi_a = 0.1$ ", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(2, 12, 2), labels = as.character(seq(2, 12, 2))) + ylim(0,1)
,

df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.5) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi:  $k_{bc}$  in c(1,2,3,6),  $\pi_a = 0.5$ ", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(1, 6, 1), labels = as.character(seq(1, 6, 1))) + ylim(0,1)
,
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.5) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi:  $k_{bc}$  in c(2,4,6,12),  $\pi_a = 0.5$ ", color = "True OR_bc")
)

```

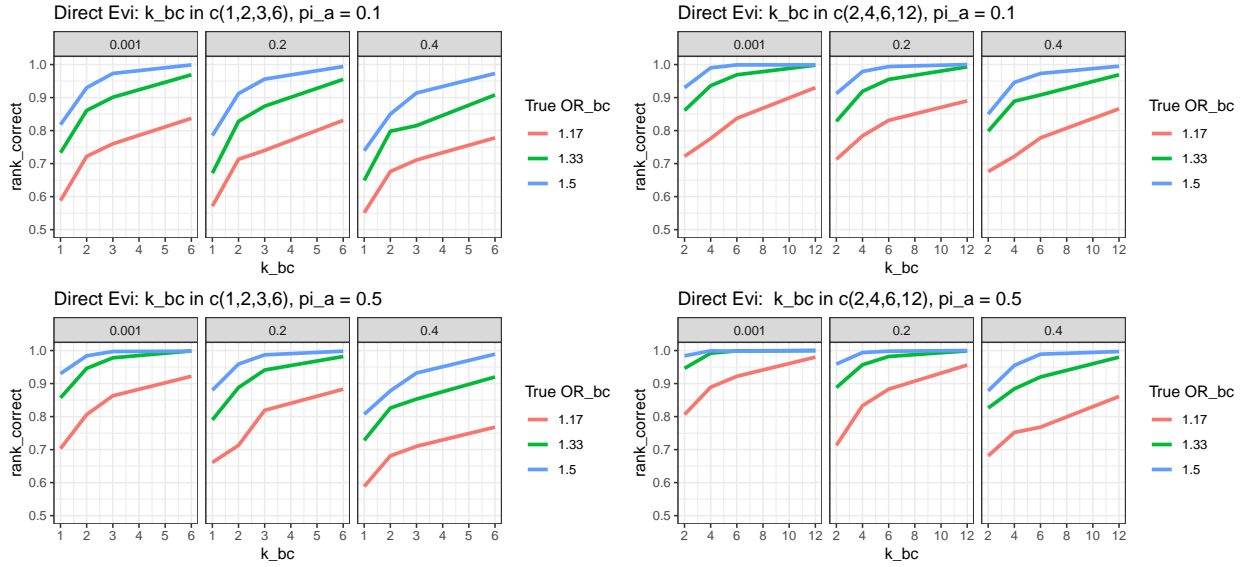
```
scale_x_continuous(breaks = seq(2, 12, 2), labels = as.character(seq(2, 12, 2))) + ylim(0,1)
)
```



```
### Rank Correct Direct
```

```
gridExtra::grid.arrange(
```

```
df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.1) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi: k_bc in c(1,2,3,6), pi_a = 0.1", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(1, 6, 1), labels = as.character(seq(1, 6, 1))) + ylim(0.5,1)
,
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.1) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi: k_bc in c(2,4,6,12), pi_a = 0.1", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(2, 12, 2), labels = as.character(seq(2, 12, 2))) + ylim(0.5,1)
,
df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.5) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi: k_bc in c(1,2,3,6), pi_a = 0.5", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(1, 6, 1), labels = as.character(seq(1, 6, 1))) + ylim(0.5,1)
,
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.5) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Direct Evi: k_bc in c(2,4,6,12), pi_a = 0.5", color = "True OR_bc") +
  scale_x_continuous(breaks = seq(2, 12, 2), labels = as.character(seq(2, 12, 2))) + ylim(0.5,1)
)
```



```
# Compare direct and indirect evidence powers
```

```
png('direct_indirect_power.png', width = 800, height = 400)
```

```
gridExtra::grid.arrange(
```

```
df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.1) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) + facet_wrap(~tau) +
  labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 6$ ) Evidence,  $\pi_a = 0.1$ "), x = k_{BC}, y = power) +
  geom_hline(linetype = "dashed", data = df_indirect_new %>% filter(k_ab == 6, pi_a == 0.1), aes(yintercept = 0.5))
```

```
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.1) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) + facet_wrap(~tau) +
  labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 12$ ) Evidence,  $\pi_a = 0.1$ "), x = k_{BC}, y = power)
```

```
df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.5) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) + facet_wrap(~tau) +
  labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 6$ ) Evidence,  $\pi_a = 0.5$ "), x = k_{BC}, y = power)
```

```
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.5) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) + facet_wrap(~tau) +
  labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 12$ ) Evidence,  $\pi_a = 0.5$ "), x = k_{BC}, y = power)
```

```
dev.off()
```

```
## pdf
```

```
## 2
```

```
# Compare direct and indirect evidence rank
```

```
png('direct_indirect_rank.png', width = 800, height = 400)
```

```

gridExtra::grid.arrange(

df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.1) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 6$ ) Evidence
),
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.1) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 12$ ) Evidence
),
df_direct_new %>% filter(k_bc %in% c(1,2,3,6), pi_a == 0.5) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 6$ ) Evidence,
),
df_direct_new %>% filter(k_bc %in% c(2,4,6,12), pi_a == 0.5) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Direct ( $k_{BC}$ ) vs. Indirect ( $k_{AB} = k_{AC} = 12$ ) Evidence
)

dev.off()

```

```

## pdf
## 2

```

```

load("df_indirect_BNMA.RData")
load("df_direct_BNMA.RData")
load("df_overall_BNMA.RData")

png('overall_power.png', width = 800, height = 400)

df_indirect_new = df_indirect_new[which(df_indirect_new$pi_a==0.1),]
df_direct_new = df_direct_new[which(df_direct_new$pi_a==0.1),]
df_BNMA_new = df_BNMA_new[which(df_BNMA_new$pi_a==0.1),]

a <- df_BNMA_new %>% filter(k_ab == 6) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Overall vs. Only Indirect Evidence ( $k_{AB} = k_{AC} = 6$ )"),
b <- df_BNMA_new %>% filter(k_ab == 12) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Overall vs. Only Indirect Evidence ( $k_{AB} = k_{AC} = 12$ )"),
c <- df_BNMA_new %>% filter(k_ab == 6) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Overall vs. Only Direct Evidence ( $k_{BC} = 1, 2, 3, 6$ )"), color
d <- df_BNMA_new %>% filter(k_ab == 12) %>%
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = TeX("Overall vs. Only Direct Evidence ( $k_{BC} = 2, 4, 6, 12$ )"), col

```

```
gridExtra::grid.arrange(a,b,c,d,ncol = 2)
```

```
dev.off()
```

```
## pdf
```

```
## 2
```

```
load("df_indirect_BNMA.RData")
```

```
load("df_direct_BNMA.RData")
```

```
load("df_overall_BNMA.RData")
```

```
df_indirect_new = df_indirect_new[which(df_indirect_new$pi_a==0.5),]
```

```
df_direct_new = df_direct_new[which(df_direct_new$pi_a==0.5),]
```

```
df_BNMA_new = df_BNMA_new[which(df_BNMA_new$pi_a==0.5),]
```

```
a <- df_BNMA_new %>% filter(k_ab == 6) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
```

```
  facet_wrap(~tau) + labs(title = "Overall vs. Only Indirect (k_ab = k_ac = 6)", color = "True OR_bc")
```

```
b <- df_BNMA_new %>% filter(k_ab == 12) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
```

```
  facet_wrap(~tau) + labs(title = "Overall vs. Only Indirect (k_ab = k_ac = 12)", color = "True OR_bc")
```

```
c <- df_BNMA_new %>% filter(k_ab == 6) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
```

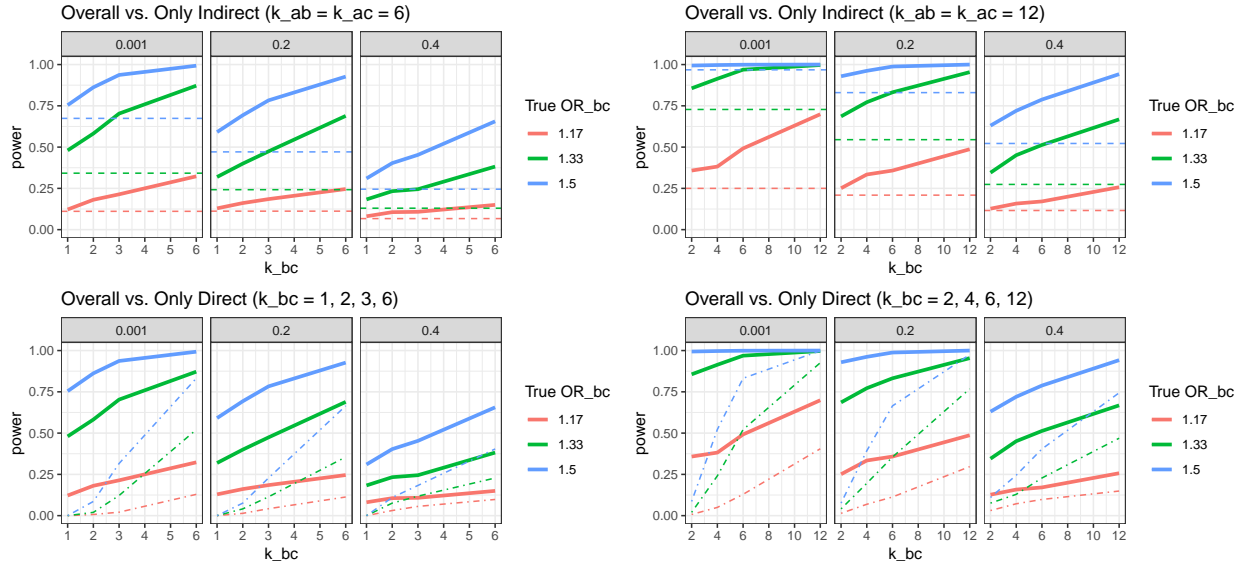
```
  facet_wrap(~tau) + labs(title = "Overall vs. Only Direct (k_bc = 1, 2, 3, 6)", color = "True OR_bc")
```

```
d <- df_BNMA_new %>% filter(k_ab == 12) %>%
```

```
  ggplot(aes(x = k_bc, y = power, color = factor(OR_bc))) + geom_line(size = 1.2) +
```

```
  facet_wrap(~tau) + labs(title = "Overall vs. Only Direct (k_bc = 2, 4, 6, 12)", color = "True OR_bc")
```

```
gridExtra::grid.arrange(a,b,c,d,ncol = 2)
```



```
load("df_indirect_BNMA.RData")
load("df_direct_BNMA.RData")
load("df_overall_BNMA.RData")

df_indirect_new = df_indirect_new[which(df_indirect_new$pi_a==0.1),]
df_direct_new = df_direct_new[which(df_direct_new$pi_a==0.1),]
df_BNMA_new = df_BNMA_new[which(df_BNMA_new$pi_a==0.1),]

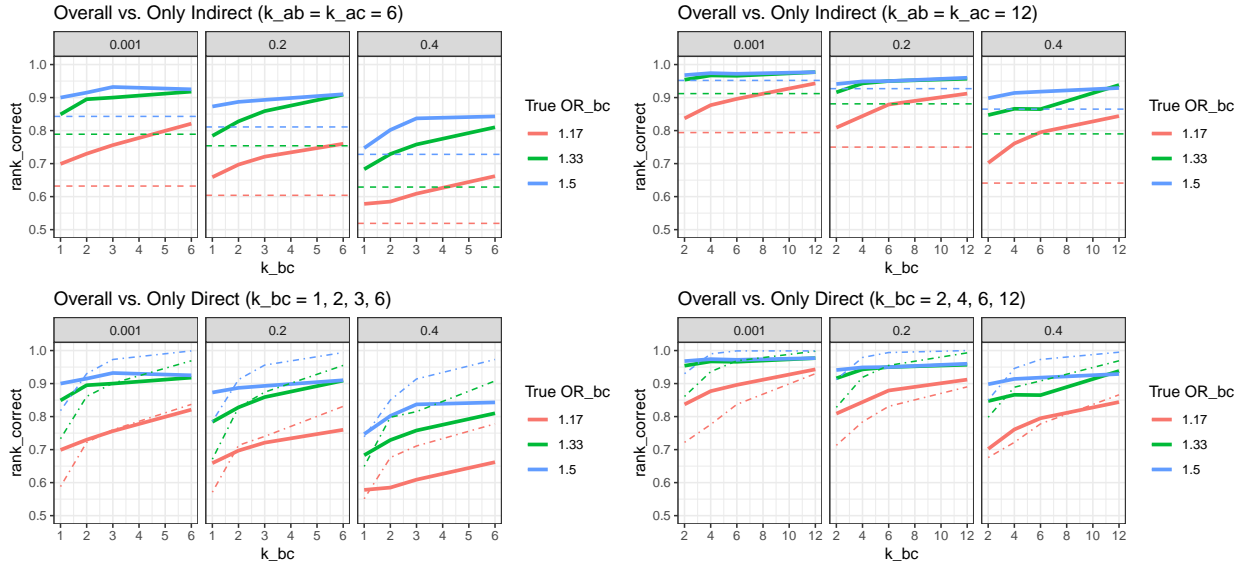
a <- df_BNMA_new %>% filter(k_ab == 6) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Indirect (k_ab = k_ac = 6)", color = "True OR_bc")

b <- df_BNMA_new %>% filter(k_ab == 12) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Indirect (k_ab = k_ac = 12)", color = "True OR_bc")

c <- df_BNMA_new %>% filter(k_ab == 6) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Direct (k_bc = 1, 2, 3, 6)", color = "True OR_bc")

d <- df_BNMA_new %>% filter(k_ab == 12) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Direct (k_bc = 2, 4, 6, 12)", color = "True OR_bc")

gridExtra::grid.arrange(a,b,c,d,ncol = 2)
```



Anomaly in the correct ranking probability between overall and direct evidence.

```
load("df_indirect_BNMA.RData")
load("df_direct_BNMA.RData")
load("df_overall_BNMA.RData")

df_indirect_new = df_indirect_new[which(df_indirect_new$pi_a==0.5),]
df_direct_new = df_direct_new[which(df_direct_new$pi_a==0.5),]
df_BNMA_new = df_BNMA_new[which(df_BNMA_new$pi_a==0.5),]

a <- df_BNMA_new %>% filter(k_ab == 6) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Indirect ( $k_{ab} = k_{ac} = 6$ )", color = "True ORbc")

b <- df_BNMA_new %>% filter(k_ab == 12) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Indirect ( $k_{ab} = k_{ac} = 12$ )", color = "True ORbc")

c <- df_BNMA_new %>% filter(k_ab == 6) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Direct ( $k_{bc} = 1, 2, 3, 6$ )", color = "True ORbc")

d <- df_BNMA_new %>% filter(k_ab == 12) %>%
  ggplot(aes(x = k_bc, y = rank_correct, color = factor(OR_bc))) + geom_line(size = 1.2) +
  facet_wrap(~tau) + labs(title = "Overall vs. Only Direct ( $k_{bc} = 2, 4, 6, 12$ )", color = "True ORbc")

gridExtra::grid.arrange(a,b,c,d,ncol = 2)
```