Inflated false-positive risk in common regression analyses:

A combinatorial analysis of model sets

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Abstract

Even with a small number of variables researchers can test many possible models of their data thus increasing the risk of false-positive results. Using combinatorics, we show that one key independent variable and three covariates can generate 95 possible models, while six covariates can generate over 2.3 million models. Such large model sets nearly guarantee false-positive results. Using simulation, we show that preregistering a single analysis with a key independent variable heavily reduces the risk of false-positives. However, even so, many models produce false-positive results with a much higher probability than the expected 5%. The worst-case scenario are models with interactions between binary dummy coded variables and omitted main effects. Such models can generate false-positive results up over 40 % of the time. While preregistration is a crucial step towards reducing false-positive results, researchers need to carefully consider what analyses they plan and we provide recommendations for what analyses to avoid. Our findings also suggest that interpreting p-values in exploratory analyses might be meaningless considering the high false-positive probability.

Keywords: type I error, false-positive statistics, replicability, simulation

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Imagine that you are interested in the effect of a key independent variable on a dependent variable. You are not sure whether your key variable may interact with other variables, so you decide to collect several covariate variables you think could influence your presumed causal chain. After collecting the data, you run multiple models with and without the additional variables as covariates in order to probe the data; you remove some outliers to improve the clarity of the results; and you finally find that your key variable significantly interacts with one of your covariates. Even though, that it might seem intuitive that this kind of practice may increase false-positive findings, there seem to be a problem in some research communities with understanding the consequences of such flexibilities (Agnoli, Wicherts, Veldkamp, Albiero, & Cubelli, 2017; Fraser, Parker, Nakagawa, Barnett, & Fidler, 2018; John, Loewenstein, & Prelec, 2012; Makel, Hodges, Cook, & Plucker, 2021). Simulations have shown that running even a small number of models with just one covariate and its interaction, dropping conditions and having multiple dependent variables can increase the chance of a false-positive result to 60.7% (J. P. Simmons, Nelson, & Simonsohn, 2011), however, these questionable research practices are presumably pervasive. Researcher flexibilities have been studied for many years and under different names, such as researcher degrees of freedom (J. P. Simmons et al., 2011), p-hacking (Simonsohn, Nelson, & Simmons, 2014), data snooping (White, 2000), data mining (Lovell, 1983), and data fishing (Selvin & Stuart, 1966), but have received increasing attention with the open science movement (Banks et al., 2019).

Open science practices forces researchers to plan and conduct their research differently; before collecting any data, they should preregister all variables, hypotheses, sample size justification, outlier criteria, and analyses they aim to run (Pham & Oh, 2021; J. Simmons, Nelson, & Simonsohn, 2021; van 't Veer & Giner-Sorolla, 2016). As everything is preregistered, a researcher may only run one model to test each hypothesis. Additional

models or tests can still be performed and published, but are then labeled as exploratory (Nosek, Ebersole, DeHaven, & Mellor, 2018). Following this procedure, one should in principle expect to increase the replicability of research results by lowering the risk of false-positives to a preset alpha level such as the conventional level of statistical significance of 5% (Moore, 2016). But can researchers rely on this procedure to entirely eliminate the increased rate of false-positive results? Probably not.

The 5% chance of a false-positive result is an assumption that relies on running only one single hypothesis test and that all statistical analysis are done correctly. Previous studies have shown that misspecifying a statistical model i.e., the true model is not contained in the model set or wrong distributional assumptions are made, can increase false-positives to above the alpha level even when running a single model (Dennis, Ponciano, Taper, & Lele, 2019; Litière, Alonso, & Molenberghs, 2007). Misspecification is not the only challenge; noise in measured independent variables e.g., individuals overstating their height or socioeconomic status, can also increase the risk of false-positives (Brunner & Austin, 2009) and so can variables with ceiling effects i.e, a large proportion of participant scores toward the high end of the scale (Austin & Brunner, 2003). Furthermore, it has also been shown that the rate of false-positive results increases when having an interaction effect with a naturally continuous covariate which has been dichotomized (Austin & Brunner, 2004; Maxwell & Delaney, 1993). The problem with such dichotomization is further aggravated when the sample size increases, which runs counter to the recommendation to use larger samples to minimize the risk of Type I errors (J. P. Simmons, Nelson, & Simonsohn, 2018).

It may appear tempting to dismiss these findings as irrelevant as long as we rely on sound scientific and statistical practices. However, it is easy to determine if a model is misspecified in a simulation study since we know the ground truth about the data generating process, but in reality we hardly ever know this. Can we judge the risk of model misspecification simply from the model? This might be possible in some cases such as when estimating the interaction effect, but omitting the corresponding main effect. Omitting the

main effect leads to a bias in the coefficients (Brambor, Clark, & Golder, 2006) which could consequently lead to a higher rate of false-positives. The practice of estimating interactions without the corresponding main effects is widespread (Brambor et al., 2006) and some method books still suggest doing this in some cases (Cleves, Gould, Gutierrez, & Marchenko, 2010). The argument is that omitting main effects is sometimes justified based on theory (Aiken, West, & Reno, 1991). The same could be true for many other common research practices. For instance, testing models using different criteria for outlier deletion or testing several dependent variables should in principle increase false-positives due to multiple testing. However, it has also been shown that running even a single model with outlier deletion can increase the rate of false-positives if the exclusion leads to range restriction in the dependent or independent variable (Raju & Brand, 2003).

To conclude, the risk of false-positive results can be inflated due to two main reasons, either from testing multiple models using researcher flexibilities or due to testing a single model under conditions such as misspecification. The open science movement has largely focused on researcher flexibilities and the risk of testing multiple models whereas traditional statistical research has focused on conditions that can inflate Type I error rates when testing a single model. Judging from previous literature, both perspectives are relevant to understanding and reducing false-positive findings and integrating them may help advance our understanding of this important topic. A direct comparison may, for instance, reveal if false-positive results are more likely to arise from researchers testing multiple models or from researchers testing a single model under certain conditions. Type I error rates can be inflated by more or less common conditions such as omitting main effects in interaction models, dichotomizing variables, or using outlier deletion, but how large is the risk compared to that of researcher flexibilities? In this paper, we jointly examine the risk of false-positives posed by testing multiple models and by testing a single model depending on the model specification. We define two outcome measures; the *false-positive probability* and the *false-positive ratio*.

Previous research on researcher flexibilities has examined the false-positive probability

(J. P. Simmons et al., 2011), which is the chance of erroneously finding one or more significant effects among all the tested ones. The false-positive probability reveals problems with conducting multiple tests and with flexible research practices in general, but it does not provide information on how many of the tested models contain a significant effect. For example, with one key variable and three covariates it is possible to test 95 models¹. If just one of these models produces a false-positive then the false-positive probability is 100%. However, the risk of running that one offending model is rather small and would require a concerted effort to test a large number of the possible models. On the other hand, if 25 of the 95 possible models produce false-positives the risk is much higher. To understand this latter aspect, we examine the false-positive ratio, which we define as the number of models with a significant key variable effect within a given set of models. Both measurements provide information about the the risk of false-positives, but under different conditions: the false-positive probability inform us about the likelihood that a researcher can generate a false-positive result when testing a large number of models, whereas the false-positive ratio informs us about the risk of producing a false-positive result when testing a single model such as when following a preregistered research plan.

In this article, we report the results of a simulation study on the false-positive probability and false-positive ratio for different types of regression models. To this end, we first develop a combinatorial analysis of all possible regression models that a researcher can test with a single variable of interest and a given number of covariates. We show how the total set of all possible models can be decomposed into seven subsets e.g., the set of models with main effects only, the set of models with interaction effects between variable of interest and covariates, the set of models with interactions between covariates, and the sets that combine sets. In our simulation, we examine the models sets separately and under different conditions such as changes in the correlation between the covariates and the dependent variable, different types of data structure (binary and continuous variables), and larger

¹ Equations for calculating this number is shown later in the paper

sample sizes. Our results show that producing a false-positive effect is not difficult, but merely a matter of testing enough models as the false-positive probability can reach just below 100% in some model sets. More importantly, our results show that testing a single preregistered model does not bind the false-positive ratio to 5% as many model sets have an inflated false-positive ratio. Finally, a larger sample does not help reduce the risk of false-positive results, and in some cases even makes it worse. Our analysis brings together two streams of literature: one concerned with researcher flexibilities and the other one concerned with type I error rates due to specific conditions such as model misspecification. Our results show that both perspectives are necessary to advance science in terms of replicability since current open-science practices may not be a sufficient safeguard against false-positive results; some types of analyses can inflate the risk of false-positive results even when preregistered.

Combinatorial analysis

When a researcher has to select which model(s) to use for testing a hypothesis, there are a lot of possibilities regarding what variables to collect and how they should enter the model. In many cases a researcher is either interested in how the variable of interest, in this case denoted as x , interacts with other variables or there is a need to control for other variables, which we call covariates and denote as $z = (z_1, z_2, \dots, z_n)$. To better understand the construction of model sets, we divided the models into seven sets based on different interaction structures. The first three sets contained the key variable of interest and simple interactions, whereas the last four sets were the combinations of the first three sets. For clarity, the model equations exclude the constant and the coefficient in front of each variable. The first set only includes models of the main effects of the variable of interest and the covariates ($x + z$). The second set includes models with a main effect of the variable of interest and interactions between the variable of interest and covariates ($x \times z$)². The third

² For simplicity, we omit the main effect of the variable of interest, x , in the notation for the second, third, and sixth model set.

set includes models with a main effect of the variable of interest and covariate-covariate interactions ($z \times z$). To obtain the last four model sets, we combine the first three model sets. This gives us the sets $x + z + x \times z$, $x + z + z \times z$, $z \times z + x \times z$, and $x + z + x \times z + z \times z$. We will go through each of the sets and show how to calculate how many models there are in them. There are, however, two ways of populating the seven model sets: with restrictions on main effects and without restrictions on main effects. Restrictions on main effects mean that whenever there is an interaction effect, the corresponding main effects have to be included in the model. Models without restrictions, on the other hand, are allowed to include interaction effects without the corresponding main effects. The calculations for the number of models in each model set with restrictions can be seen in the next paragraph whereas with no restrictions these calculation can be found in the *Appendix* in section [Model sets without restrictions](#).

Model sets with restrictions

In the case with restrictions, we enforce that every time there is an interaction effect, the corresponding main effects are included in the model as in the model below:

$$y = x_1 + z_1 + x_1 z_1$$

In the previous equation, we have an interaction between our variable of interest x_1 and a covariate z_1 . Therefore, the two corresponding main effects also enter the model. This restriction does not put any restrictions on the $x + z$ set as there are no interactions in it. On the other hand, the restriction implies that the sets $x \times z$ and $z \times z$ are empty sets as the models in these sets never have main effects following interactions. We will therefore not show them here, but they are part of the model sets in the *Appendix* in section [Model sets without restrictions](#).

Set $x + z$. The set $x + z$ contains all the combinations that can be made by the covariates z and the variable of interest x including the model where there is only the variable x . Based on the previous terminology the model containing only the variable of

interest is therefore the empty set and the binomial coefficient computes how many combinations there can be made by z . Let us denote the number of covariates n . If we, for example, have three covariates ($n = 3$), then the number of combinations where all three covariates are present can be written using the binomial coefficient as

$$\# \text{ of models in } x + z = \binom{3}{3} + \binom{3}{2} + \binom{3}{1} + \binom{3}{0} = \sum_{i=0}^3 \binom{3}{i}$$

Using the rule for adding binomial coefficients, we can rewrite this into

$$\# \text{ of models in } x + z = \sum_{i=0}^3 \binom{3}{i} = 2^3 = 8$$

We can generalize this to the case with n covariates as follows

$$\# \text{ of models in } x + z = \sum_{i=0}^n \binom{n}{i} = 2^n$$

Formally written. This size of this set can also be more formally calculated. This is done by using the notation from set theory to calculate the size of each set. Let Z be the set of covariates

$$Z = \{z_1, z_2, \dots, z_n\}$$

$$|Z| = n$$

The $x + z$ set is then the power set of Z

$$x + z = \{S : S \subseteq Z\}$$

Each element $S \in x + z$ is a set of the covariates e.g., $S = z_3, z_7$, or any combination of

the covariates, including the empty set. This is just the power set of Z and the size of the set can be written as

$$|x + z| = |\mathcal{P}(Z)| = 2^n$$

Set $x + z + x \times z$. For the sake of simplicity, we begin with the case where $n = 3$.

The models in this set can be seen in Table 1. Here the models are split into three different parts. These are split such that $x + z + x \times z(1)$, $x + z + x \times z(2)$, and $x + z + x \times z(3)$ contain all the models where there are one, two, or three covariates, respectively.

Table 1

Example of division of the $x + z + x \times z$ set into three subsets when there are three covariates and one dependent variable. $x + z + x \times z(1)$ contains all the models with one covariate as main effect, $x + z + x \times z(2)$ all the models with two covariates, and $x + z + x \times z(3)$ all the models with three covariates

Set	Models
$x + z + x \times z(1)$	$y = x_1 + z_1 + x_1 z_1$
	$y = x_1 + z_2 + x_1 z_2$
	$y = x_1 + z_3 + x_1 z_3$
$x + z + x \times z(2)$	$y = x_1 + z_1 + z_2 + x_1 z_1$
	$y = x_1 + z_1 + z_3 + x_1 z_1$
	$y = x_1 + z_3 + z_1 + x_1 z_3$
	$y = x_1 + z_3 + z_2 + x_1 z_3$
	$y = x_1 + z_2 + z_1 + x_1 z_2$
	$y = x_1 + z_2 + z_3 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_1 + x_1 z_2$
	$y = x_1 + z_1 + z_3 + x_1 z_1 + x_1 z_3$
	$y = x_1 + z_1 + z_2 + x_1 z_3 + x_1 z_2$
$x + z + x \times z(3)$	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_3$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1 + x_1 z_3$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_3 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1 + x_1 z_2 + x_1 z_3$

To calculate the size of each of these sets separately, we only need to focus on the number of covariates that enter the model, as per assumption the variable of interest x_1 is

always present. Let us start with the $x + z + x \times z(1)$ set. In this set, there can only be one covariate present at the time; there are therefore three combinations, which can be written as $\binom{3}{1}$. In this set, since there is only one covariate, there is only one interaction effect containing that same covariate. As no other combinations can be made, this corresponds to $\binom{1}{1}$. Using the same shorthand notation with the binomial coefficient as above, we can write the number of models in the $x + z + x \times z(1)$ set as

$$\# \text{ of models in } x + z + x \times z(1) = \binom{1}{1} \binom{3}{1} = \sum_{i=1}^1 \binom{1}{i} \binom{3}{1} = (2^1 - 1) \binom{3}{1} = 3$$

Using this notation is useful when we later have to combine the three sets of $x + z + x \times z$ into one to calculate the total number of models in $x + z + x \times z$. For the $x + z + x \times z(2)$ set, we first need to calculate the number of combinations for the main effect that can be made when there are two covariates present at all times and that is $\binom{3}{2}$. Next we need to calculate the number of combinations of interactions that can be present. As we have two covariates present all the time, these are the ones that can be used in the interaction effects. Since the covariates interact with x_1 , there can either be one or two interaction effects present. Hence, we have $\binom{2}{1}$ and $\binom{2}{2}$ combinations of the interaction effects possible. Combining the number of covariates with the number of possible interactions we get

$$\begin{aligned} \# \text{ of models in } x + z + x \times z(2) &= \\ &= \binom{2}{1} \binom{3}{2} + \binom{2}{2} \binom{3}{2} = \\ &= \sum_{i=1}^2 \binom{2}{i} \binom{3}{2} = (2^2 - 1) \binom{3}{2} = 9 \end{aligned}$$

The same reasoning goes for the $x + z + x \times z(3)$ set; the only difference here is that we have one more covariate. So if we write the combinations that are possible with three covariates in

the same way as before, we get

$$\begin{aligned}
 \# \text{ of models in } x + z + x \times z(3) &= \\
 &= \binom{3}{1} \binom{3}{3} + \binom{3}{2} \binom{3}{3} + \binom{3}{3} \binom{3}{3} = \\
 &= \sum_{i=1}^3 \binom{2}{i} \binom{3}{2} = \\
 &= (2^3 - 1) \binom{3}{3} = 7
 \end{aligned}$$

We can then sum all three sets that is, $x + z + x \times z(1)$, $x + z + x \times z(2)$, and $x + z + x \times z(3)$, to get the size of the $x + z + x \times z$ set

$$\# \text{ of models in } x + z + x \times z = \sum_{k=1}^3 (2^k - 1) \binom{3}{k}$$

where k is the number of covariates that enter as main effects, meaning it is an indicator for $x + z + x \times z(1)$, $x + z + x \times z(2)$ and $x + z + x \times z(3)$. For the case with n covariates, this becomes

$$\# \text{ of models in } x + z + x \times z = \sum_{k=1}^n (2^k - 1) \binom{n}{k}$$

Formally written. Again, we can calculate the size of this set in a more formal way. As before, let Z be a set of covariates

$$Z = \{z_1, z_2, \dots, z_n\}$$

$$|Z| = n$$

Let J be a set of indicators of how many covariates enter the model set as main effects

$$J = \{1, 2, 3, 4, \dots, n\}$$

Let L be a subset of Z of size k

$$L = \{S : S \subset Z, |S| = k, k \in J\}$$

The number of interactions that can be made between a covariate and the variable of interest for a given k is then

$$I_h(Z) = \{\{z_i, x_1\} : z_i \in L\}$$

$$|I_h(Z)| = k$$

For each k , the number of interactions is just the power set of Z excluding the empty set

$$|\mathcal{P}(I_h(Z) : I_h(Z) \neq \emptyset)| = 2^k - 1$$

For each k , there is $\binom{n}{k}$ combinations of interactions that can be present with the number of covariates k . To get the full set, we need to sum over these combinations from $k = 1$ to n (with $k = 0$ it would not be possible to make any interactions so this one is excluded).

$$|x + z + x \times z| = \sum_{k=1}^n \binom{n}{k} (2^k - 1)$$

Set $x + z + x \times z$. Here we can use the same line of reasoning as for the $x + z + x \times z$ set. Let us begin by examining the case where $n = 3$ and then develop a more general notion. To make it easier to understand how to calculate the set size, we split this set into subsets as we did above for the $x + z + x \times z$ set. This example can be seen in Table 2.

A model must always include at least two covariates to fulfil the restriction that main

Table 2

Division of the $x + z + z \times z$ set into two subsets when there are three covariates and one dependent variable. $x + z + z \times z(2)$ contains all the models with two covariates as main effects, and $x + z + z \times z(3)$ all the models with three covariates. $x + z + z \times z(1)$ is an empty set since at least two covariates are necessary to make an interaction.

Set	Models
$x + z + z \times z(2)$	$y = x_1 + z_1 + z_2 + z_1z_2$
	$y = x_1 + z_1 + z_3 + z_1z_3$
	$y = x_1 + z_2 + z_3 + z_2z_3$
$x + z + z \times z(3)$	$y = x_1 + z_1 + z_2 + z_3 + z_1z_2$
	$y = x_1 + z_1 + z_3 + z_2 + z_1z_3$
	$y = x_1 + z_2 + z_3 + z_1 + z_2z_3$
	$y = x_1 + z_1 + z_2 + z_3 + z_1z_2 + z_1z_3$
	$y = x_1 + z_1 + z_3 + z_2 + z_1z_3 + z_2z_3$
	$y = x_1 + z_2 + z_3 + z_1 + z_1z_2 + z_2z_3$
	$y = x_1 + z_1 + z_2 + z_3 + z_1z_2 + z_2z_3 + z_1z_3$

effects follow interactions effects. Therefore, we can divide the $x + z + z \times z$ set into two subsets; the first subset has two covariates present as main effects and the second subset has three covariates present as main effects. The first set, $x + z + z \times z(2)$, is the number of combinations that can be made from two out of three covariates, meaning $\binom{3}{2}$, multiplied with the combinations of the two covariates that are included, meaning $\binom{2}{2}$.

$$\# \text{ of models in } x + z + z \times z(2) = \binom{3}{2} \binom{2}{2} = 3$$

For the second subset, $x + z + z \times z(3)$, the first term is the number of combinations that can be made with three covariates so this is $\binom{3}{3}$. We then have to calculate the number of interactions that can be made with the three included covariates. To do that, first we need to calculate the number of two-way interactions that can be made with three covariates and this is $\binom{3}{2} = 3$. The total number of models in the set is then the sum of the number of

combinations

$$\# \text{ of models in } x + z + z \times z(3) = \binom{3}{3} \left(\binom{3}{1} + \binom{3}{2} + \binom{3}{3} \right) = \binom{3}{3} \sum_{i=1}^3 \binom{3}{i}$$

However, it is only in this example that we sum to $n = 3$. In general, this will be the number of pairs that can be made in this subset. The number of pairs can be written as

$$\binom{n}{2} = \frac{n(n-1)}{2}. \text{ This then becomes}$$

$$\# \text{ of models in } x + z + z \times z(3) = \binom{3}{3} \sum_{i=1}^3 \binom{3}{i} = \binom{3}{3} \sum_{i=1}^{\frac{3(3-1)}{2}} \binom{\frac{3(3-1)}{2}}{i} = \binom{3}{3} \left(2^{\frac{3(3-1)}{2}} - 1 \right)$$

We can write the first subset in the same way

$$\# \text{ of models in } x + z + z \times z(2) = \binom{3}{2} = \binom{3}{2} \left(2^{\frac{2(2-1)}{2}} - 1 \right)$$

Now we just add these two subsets up

$$\# \text{ of models in } x + z + z \times z = \binom{3}{2} \left(2^{\frac{2(2-1)}{2}} - 1 \right) + \binom{3}{3} \left(2^{\frac{3(3-1)}{2}} - 1 \right) = \sum_{k=2}^3 \binom{3}{k} \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

We can then generalize this case for n covariates

$$\# \text{ of models in } x + z + z \times z = \sum_{k=2}^n \binom{n}{k} \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Formally written. As done in the other two cases we let Z be a set of covariates

$$Z = \{z_1, z_2, \dots, z_n\}$$

$$|Z| = n$$

Let k be an indicator of how many covariates are included. Since we are using interactions, k must begin at two. Let T be a set of indicators of the number of covariates beginning at two

$$T = \{2, 3, 4, \dots, n\}$$

Let L be a subset of Z of size k

$$L = \{S : S \subset Z, |S| = k, k \in T\}$$

The number of interactions that can be made for a given k is then

$$I_k(Z) = \{\{z_i, z_j\} : z_i \in L, z_j \in L, z_i \neq z_j\}$$

For a given k , the number of two-way interactions that can be made is then

$$|I_k(Z)| = \binom{k}{2} = \frac{k!}{2!(k-2)!} = \frac{k(k-1)(k-2)!}{(k-2)!} \frac{1}{2} = \frac{k(k-1)}{2}$$

We then need the combinations of all the two-way interactions. For all k , we can take the power set of $I_k(H)$ excluding the empty set

$$P(I_k(Z)) = \{T : T \subset I_k(Z), T \neq \emptyset\}$$

$$|P(I_k(Z))| = 2^{|I_k(Z)|} - 1 = 2^{\frac{k(k-1)}{2}} - 1$$

With n covariates, there exist $\binom{n}{k}$ subsets of size k . To get the $x + z + z \times z$ set, we need

to sum over the number of covariates k starting from $k = 2$

$$|x + z + z \times z| = \sum_{k=2}^n \binom{n}{k} \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Set $x + z + x \times z + z \times z$. This set is the product of the $x + z + x \times z$ and $x + z + z \times z$ sets, but without including the main effect twice. Hence, the set consists of the combinations that can be made between the variable of interest and the covariates and between the covariates alone. We can therefore write

$$\# \text{ of models in } x + z + x \times z + z \times z = \sum_{k=2}^n \binom{n}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Formally written. The design of the subsets is the same as earlier and we just need to take the product of $P(I_k(Z))$ and $P(I_h(Z))$, as defined above, and sum over k beginning at two. For n covariates, there exists $\binom{n}{k}$ subsets of size k . We then need to sum the subsets as follows

$$|x + z + x \times z + z \times z| = \sum_{k=2}^n \binom{n}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Full model set with restrictions

Equation (1) shows how to calculate the total number of models given one key variable of interest and a given number of covariates with the main effects restriction that models with interaction effects must include the corresponding main effects. Each underlined section in Equation (1) can also be used to calculate the size of the specified model set. restriction.

$$\begin{aligned}
\# \text{ models} = & \underbrace{\binom{2^n}_{x+z}}_{x+z} + \underbrace{\sum_{k=1}^n \binom{2^k - 1}{k} \binom{n}{k}}_{x+z+x \times z} + \\
& \underbrace{\sum_{k=2}^n \binom{n}{k} \left(2^{\frac{k(k-1)}{2}} - 1\right)}_{x+z+z \times z} + \\
& \underbrace{\sum_{k=2}^n \binom{n}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1\right)}_{x+z+x \times z + z \times z}
\end{aligned} \tag{1}$$

where n denotes the number of covariates (all the z variables) collected and $\binom{n}{k}$ is the binomial coefficient, the calculation of which is explained in the *Appendix* in the section **Binomial coefficient**. Equation (1) does not include the $(x \times z)$, $(z \times z)$, and $(x \times z + z \times z)$ sets as these include interaction effects without the corresponding main effects, and these are therefore empty sets. For the case with two covariates, the total number of models is calculated as follows:

$$\# \text{ of models} = \binom{2^2}{x+z} + \sum_{k=1}^2 \binom{2^k - 1}{k} \binom{2}{k} + \sum_{k=2}^2 \binom{2}{k} \left(2^{\frac{k(k-1)}{2}} - 1\right) + \sum_{k=2}^2 \binom{2}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1\right)$$

which is equal to $4 + 5 + 1 + 3 * 1 = 13$. The number of models in each model set for different numbers of covariates depending on main effect restrictions can be seen in Table 3. In the simulation, we focus on two to three covariates since this is enough to provide an impression of how the increase in the size of the model set affects the FPP and FPR.

In Table 4, can be found an examples of all model sets with one variable of interest, x_1 , and two covariates, z_1 and z_2 . The calculations for the model sets with no restrictions can be found in Appendix section **Model sets without restrictions**.

Table 3

The total number of models for any given set considering the different number of covariates, with and without restriction that main effects should be present when having interaction effects.

With restrictions	Number of covariates				
	2	3	4	5	6
$x + z$	4	8	16	32	64
$x \times z$	0	0	0	0	0
$z \times z$	0	0	0	0	0
$x + z + x \times z$	5	19	65	211	665
$x + z + z \times z$	1	10	97	1418	40005
$x \times z + z \times z$	0	0	0	0	0
$x + z + x \times z + z \times z$	3	58	1159	36958	2269799
Without restrictions					
$x + z$	4	8	16	32	64
$x \times z$	3	7	15	31	63
$z \times z$	1	4	32	512	16384
$x + z + x \times z$	9	49	225	961	3969
$x + z + z \times z$	3	49	945	31713	2064321
$x \times z + z \times z$	3	49	945	31713	2064321
$x + z + x \times z + z \times z$	9	343	14175	983103	130052223

Note: $x + z$ = models with main effects only; $x \times z$ = models with interactions between the variable of interest and covariates; $z \times z$ = models with interactions between covariates; $x + z + x \times z$ = models with main effects and interactions between the variable of interest and covariates; $x + z + z \times z$ = models with main effects and interactions between covariates; $x \times z + z \times z$ = models with interactions between covariates and variable of interest and interactions between covariates; $x + z + x \times z + z \times z$ = models with main effects and interactions between the variable of interest and covariates and the interactions between covariates.

Simulation analysis

Focusing on model selection in data analysis, we investigated the false-positive probability (FPP) and false-positive ratio (FPR) for a key independent variable that was uncorrelated with any other variables using a simulation. We used different number of covariates and interaction effects as well as a varying sample size. The effect of the different model sets were tested using different correlations between the dependent variable and covariates, and different data structures. Even though in some simple cases it would be possible to calculate a closed-form solution for the FPP and FPR e.g., when looking at only

Table 4

An overview of the model sets when there are two covariates and one dependent variable depending on the restriction that corresponding main effects must follow interaction effects. The $x + z$ set contains all of the main effects; the $x + z + x \times z$ set includes the main effects and interactions between the variable of interest and the covariates; the $x + z + z \times z$ set contains the main effects and interactions between the covariates; the $x + z + x \times z + z \times z$ set contains the main effects, the interactions between the variable of interest and covariates, and the interactions between the covariates; the $x \times z$, $z \times z$ and $x \times z + z \times z$ sets are empty sets due to the restriction that main effects must follow interaction effects.

Model set	Models with restrictions	Models without restrictions
$x + z$	$y = x_1$	$y = x_1$
	$y = x_1 + z_1$	$y = x_1 + z_1$
	$y = x_1 + z_2$	$y = x_1 + z_2$
	$y = x_1 + z_1 + z_2$	$y = x_1 + z_1 + z_2$
$x \times z$	Empty set	$y = x_1 + x_1 z_1$
		$y = x_1 + x_1 z_2$
		$y = x_1 + x_1 z_1 + x_1 z_2$
$z \times z$	Empty set	$y = x_1 + z_1 z_2$
$x + z + x \times z$		$y = x_1 + z_1 + x_1 z_1$
		$y = x_1 + z_1 + x_1 z_2$
	$y = x_1 + z_1 + x_1 z_1$	$y = x_1 + z_1 + x_1 z_1 + x_1 z_2$
	$y = x_1 + z_2 + x_1 z_2$	$y = x_1 + z_1 + x_1 z_1 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_1$	$y = x_1 + z_2 + x_1 z_1$
	$y = x_1 + z_1 + z_2 + x_1 z_2$	$y = x_1 + z_2 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_1 + x_1 z_2$	$y = x_1 + z_2 + x_1 z_1 + x_1 z_2$
		$y = x_1 + z_1 + z_2 + x_1 z_1$
		$y = x_1 + z_1 + z_2 + x_1 z_2$
		$y = x_1 + z_1 + z_2 + x_1 z_1 + x_1 z_2$
$x + z + z \times z$	$y = x_1 + z_1 + z_2 + z_1 z_2$	$y = x_1 + z_1 + z_1 z_2$
		$y = x_1 + z_2 + z_1 z_2$
		$y = x_1 + z_1 + z_2 + z_1 z_2$
$x \times z + z \times z$	Empty set	$y = x_1 + x_1 z_1 + z_1 z_2$
		$y = x_1 + x_1 z_2 + z_1 z_2$
		$y = x_1 + x_1 z_1 + x_1 z_2 + z_1 z_2$
$x + z + x \times z + z \times z$		$y = x_1 + z_1 + x_1 z_1 + z_1 z_2$
		$y = x_1 + z_1 + x_1 z_2 + z_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_1 + z_1 z_2$	$y = x_1 + z_1 + x_1 z_1 + x_1 z_2 + z_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_2 + z_1 z_2$	$y = x_1 + z_2 + x_1 z_1 + z_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_1 + x_1 z_2 + z_1 z_2$	$y = x_1 + z_2 + x_1 z_2 + z_1 z_2$
		$y = x_1 + z_2 + x_1 z_1 + x_1 z_2 + z_1 z_2$
		$y = x_1 + z_1 + z_2 + x_1 z_1 + z_1 z_2$
		$y = x_1 + z_1 + z_2 + x_1 z_2 + z_1 z_2$
		$y = x_1 + z_1 + z_2 + x_1 z_1 + x_1 z_2 + z_1 z_2$

one main effect, we used a simulation since it was not clear how different flexibilities would impact the FPP and FPR. In this section it will be described how to split different models into different sets and how to calculate how many models there are within each set

Data Generating Process

As the goal of the simulation was to understand the different model sets and what can lead to false-positive results, the variable of interest was simulated without any correlation with either the dependent variable or any of the covariates. The variable of interest could either have a normal distribution (continuous variable) or a binomial distribution (binary variable). The covariates were simulated using the same distribution so that all covariate distributions in a dataset were either normal or binomially distributed. As our target analysis was linear regression, the dependent variable was always simulated as a normal distribution. There were four different combinations of the variable of interest x and covariate z distributions: x and z are continuous, x and z are binary, x is continuous and z is binary, x is binary and z is continuous. The correlation between the dependent variable and covariates was simulated with three different levels ($r = 0.2$, $r = 0.3$, and $r = 0.4$) corresponding to medium-strength correlations (Cohen, 1988). The correlation between the variable of interest and covariates as well as the correlation between the covariates themselves was always set to zero. The correlation matrix for the data structure when there is only one dependent variable is presented in Table A3 in the *Appendix*. If a variable was generated as a normally distributed variable, it was generated with a mean of 0 and a standard deviation of 1, while binomial variables were generated with a 50% chance of success in each trial. To test how the sample size affected the FPP and FPR, the simulation included samples with sizes ranging from 50 to 400 with increasing steps of 50.

Simulation

In the simulation results presented in the main results section, we only included cases in which the variable of interest and covariates had the same distribution. The two other

cases i.e., when the variable of interest was binary and the covariates were continuous and the other way around can be found in the online *Supplementary Information*. For analyses not addressing the effect of sample size, the default sample size was kept constant at 200. When the effect of different correlation levels between covariates was not analyzed, the correlation between the dependent variable and covariates was set to a default of $r = 0.2$. We did not apply any outlier deletion.

We used R ([Team, 2020](#)) to perform our simulation with 10,000 simulation iterations. When the variables had a binomial distribution, the variables were simulated using the package BinNor ([Demirtas, Amatya, & Doganay, 2014](#)). The data were analyzed with linear regressions. We defined a false-positive result as any model where the variable of interest was significant ($p < .05$), either in a main effect or in an interaction with a covariate variable. The FPP was defined as

$$FPP_i = \begin{cases} 1 & \text{if any model in iteration } i \text{ produces a false - positive result} \\ 0 & \text{otherwise} \end{cases}$$

$$FPP = \frac{\sum_i^N FPP_i}{N}$$

Where N denotes the number of iterations in the simulation. The FPR is the ratio of the models with a false-positive result and was defined as

$$FPR_i = \frac{\# \text{ false - positive models in iteration } i}{\# \text{ all models in the set in iteration } i}$$

$$FPR = \frac{\sum_i^N FPR_i}{N}$$

Simulation results

To make the simulation results easier to understand we begin by outlining a baseline model with one independent variable of interest and two covariates split by the different

model sets. we then show the results of what happens when including more covariates, what happens when the sample size increases or decreases, and having different correlations between the dependent variable and covariates.

Model specification

Looking at the FPP and FPR between the different sets in the baseline model, it is clear that the highest FPP and FPR are obtained in the $x \times z$ and $x + z + x \times z$ sets (see Figure 1). This is the case when using interaction effects both when the corresponding main effects are present and when they are not present. When the corresponding main effects are not present and the variable of interest and covariates are binary and dummy coded, the FPP and FPR are particularly high. This is because the dummy coded variable of interest splits the true effect of the covariate into the interaction and the constant. In this case, the FPP for the $x \times z$ set is 82.7% and 86.9% for the $x + z + x \times z$ set. When the variables are continuous and everything else is equal, the FPP for the two sets are 18.8% and 23.5%, respectively. With the restriction that main effects must follow interactions, only the $x + z + x \times z$ set remains because the $x \times z$ set becomes an empty set. In this case, the FPP is 21.1% for binary (dummy coded) variables and 18.1% for continuous variables.

Looking at the FPR, we see that in many model sets the proportion of models with a significant effect is around the expected 5% (see red bars in Figure 1). However, in sets with interactions between the variable of interest and covariates with omitted main effects (left hand side of Figure 1), the FPR is above 5%. For the $x \times z$ set with binary and dummy coded variables and without corresponding main effects the FPR is 34.5%.

Number of covariates

Adding one more covariate to the baseline model to get three in total increases the FPP across all model sets (see Figure 2). The increase is the highest for binary and dummy coded variables with no restrictions on main effects to follow interaction effects. Several of the sets with interactions between the variable of interest and covariates reach an FPP of

Figure 1. The false-positive probability and false-positive ratio given different model sets, the presence of main effects when having interactions, and different distributions of the variable of interest and covariates. Sample size is set to 200, the correlation between the dependent variable and covariates is $r = 0.2$, and there are two covariates. The false-positive probability is shown in black and the false-positive ratio in red. Dashed blacked line shows the critical value, here set at 0.05

just below 100%. The increase is also evident even when main effects are present when having interactions. In that case, the largest increase in the FPP is in the $x + z + x \times z + z \times z$ set which increases 14.7 percentage points when the variable of interest and covariates are binary (dummy coded) and 13.1 percentage points when the variables are continuous. The FPR also increases for all sets with an interaction between the variable of interest and covariates although the main increase happens when there is no restriction that main effects most follow interactions and when the variables are binary and dummy coded.

Figure 2. The false-positive probability and false-positive ratio when using three covariates. Black bars are the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure 1.

Sample size

Increasing the sample size in the baseline model and thereby improving the precision of the estimates has, in most of the conditions, no effect on either the FPP or FPR. However, in sets with interactions between the variable of interest and covariates where main effects are not included and variables are binary and dummy coded, larger sample sizes increase the FPP (See Figure 3). In the $x \times z$ and $x + z + x \times z$ sets the FPP reaches just below 100% as the sample size increases to 300. In these sets, the larger sample sizes also lead to increases in the FPR with the largest increase of 41.9% for the $x \times z$ set.

Correlation between dependent variable and covariates

Increasing the correlation between the dependent variable and covariates in the baseline model increases the FPP for most conditions and the FPR for some conditions (see

Figure 3. The effect of increasing sample size on the false-positive probability and false-positive ratio. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure 1.

Figure A2). The model sets with interactions between the variable of interest and covariates have the highest increase in both the FPP and FPR. The effect is most pronounced when the variable of interest and covariates are binary and dummy coded. The increase in the FPP for these sets is as high as 26.5 percentage points when the correlation increases from $r = 0.2$ to $r = 0.3$. When the correlation increases from $r = 0.3$ to $r = 0.4$, the FPP increases only in some conditions where the FPP is not already close to 100%. The increase in correlation also affects the FPR for the same sets increasing it to as much as 14.4% when going from $r = 0.2$ to $r = 0.3$ and similarly when going from $r = 0.3$ to $r = 0.4$. This increase is however not only present when there is allowed for interactions without main effects. Even in the correct specified models the FPP increases to some extent when there is an increase in the correlation between the dependent variable and the covariates. As in the misspecified models this happens when there are interactions between the variable of interest and the covariates.

Discussion

There is a growing awareness among researchers of the need to lower the number of false-positive results reported in the scientific literature. One way to reduce false-positive results is by preregistering a single data plan for pre-processing and analysis since this removes researcher flexibilities that can otherwise inflate the risk of false-positives (J. P. Simmons et al., 2018). However, there is an ongoing discussion about the effectiveness of this procedure (see e.g. Pham and Oh (2021) and J. Simmons et al. (2021)). While researcher flexibilities such as the use of outlier criteria or multiple dependent variables are often featured as the main cause of false-positive results (John et al., 2012), previous research has shown that conditions such as model misspecification, noise or ceiling effects in the independent variables, or dichotomization of continuous covariates may also lead to type I error rates beyond 5% (Austin & Brunner, 2003, 2004; Brunner & Austin, 2009; Dennis et al., 2019; Litière et al., 2007).

Using a simulation approach, we examine the role of various data structure and data analysis conditions in generating false-positive results: constructing a model set with several covariates, allowing for interactions with and without main effects being present, using different sample sizes, and the strength of correlations between the dependent variable and the covariates. We examine the effect of these conditions on the false-positive probability (FPP) i.e., the chance of erroneously finding one or more significant effects among all the tested models, and on the false-positive ratio (FPR) i.e., the ratio of false-positive models to all tested models. The FPP tells us what the probability of a false-positive result is if a researcher tests all models and flexibilities. This metric is informative about exploratory analyses that is, when there is no clear plan beforehand regarding what should be analysed. The FPR tells us about the probability of a false-positive result if a researcher only tests one model under certain conditions. This means that the FPR can be seen as the risk of a false-positive result for researchers that preregister their analysis plan.

Our findings show that in many cases the FPR lies in the vicinity of the expected 5%,

which is an indicator that preregistering and running a single analysis is generally very helpful for lowering the risk of obtaining a false-positive result. However, preregistration is not always sufficient to reach the desired 5%. In particular, preregistration is less effective when the preregistered model includes interactions without main effects and especially when covariates are binary and dummy coded. In this case, the FPR reaches over 34 %. This happens due to the fact that the interaction effect captures the true effect of the covariate that would have otherwise been expressed as a significant main effect of the covariate, i.e. we get a misspecified model with a biased estimate. Although some authors suggests that one can omit main effects in models with interaction effects when it is theoretically justified, there is a clear statistical reason not to do this, especially when covariates are binary and dummy coded. One way to mitigate this issue is to always include main effects when interaction effects are of interest. However, even so, the FPR will still be slightly higher than 5%. This is due to the fact that multiple tests are performed at the same time. This may then require an adjustment of the p-value such as Bonferroni correction (Dunn, 1961). Our calculations show that a Bonferroni correction can in fact remedy the issue and bind the FPR at the level 0.05 regardless of the model specification (see *Supplementary Information* in section **Results when using Bonferroni correction of p-values**).

Given the ease with which one can obtain an FPP of 100% the usefulness of significance tests in exploratory analyses is strongly reduced. Even when correctly performing analyses such as including all corresponding main effects to interaction effects and using Bonferroni correction to obtain a desired FPR, the FPP is still higher than 5% (see Figure 1 with restrictions on main effects). A standard approach to significance testing is therefore problematic for determining the presence of an effect if the analysis is exploratory. An alternative could be a more severe threshold for significance (see suggestions by Benjamin et al. (2018)) or focusing on effect sizes rather than significance levels. However, we do not recommend any conclusions about an effect being true or not in any exploratory analysis using p-values.

It has been suggested that one way to lower the FPP is to ensure sufficient statistical power by having enough observations per cell to detect a true effect ([J. P. Simmons et al., 2011, 2018](#)). However, our simulations show that this is not an effective way to lower neither the FPP nor FPR. In most cases, the sample size does not affect either the FPP or FPR, but under some conditions, such as when leaving out main effects when using interactions (having biased estimates), larger samples can actually increase the FPP and FPR. This may seem counter-intuitive. However, we should bear in mind that here we investigate how often a true null effect can become significant. In this case, if there is no bias from the estimate and the models are correctly specified, the distribution of the p-values would be uniform if only one variable is tested and therefore not affected by the increase in sample size ([Murdoch, Tsai, & Adcock, 2008](#)). In a situation where there is a true effect, a larger sample is indeed necessary as small samples can produce exaggerated effects or even effects in the opposite direction ([Gelman & Carlin, 2014](#)). In cases where there is a true effect the p-values would be normally distributed with a sufficient large sample. Here the issue would be of having a small sample and a low correlation between the dependent variable and the variable of interest as this again would lead to a uniform distribution. Naturally, we do not recommend using small sample sizes, but simply point out that having a large sample does not guarantee an FPP or FPR of 5%.

We also tested the influence of the correlation structure between the dependent variable and covariates. The true correlation structure is often unknown to the researcher, but can in some cases be inferred from prior literature using similar measures. We find that the higher the correlation between the covariates and dependent variable, the easier it is to find a model with a false-positive result both in a single preregistered analysis and exploratory analyses. However, this only holds for models with interaction effects between the variable of interest and covariates. Study designs with common method bias i.e., that measure all covariates in one survey, could be particularly problematic due to the increased correlation between the variables ([Podsakoff, MacKenzie, Lee, & Podsakoff, 2003](#)). A

potential remedy could be to report correlation matrices which would allow readers to assess whether there is an increased risk of false-positive findings as higher correlation between the covariates and the dependent variable could lead to higher risk of false positive if there is interactions between the variable of interest and the covariates.

To summarize, our findings reinforce some well-known measures against false-positive results, but also suggest several new ones. First and foremost researchers should follow guidelines for preregistration (Nosek et al., 2015; van 't Veer & Giner-Sorolla, 2016) which reduces the number of researcher flexibilities such as the use of outlier criteria, multiple dependent variables, or testing multiple models. Second, Bonferroni corrections should be used when running regressions with interaction effects to avoid having the FPP and FPR higher than 5%. Third, when testing interaction effects models should always include the corresponding main effects. Fourth, having a large sample does not legitimize exploratory analyses. In general, the sample size only affects the power of the study and the precision of the estimates, it does not remedy the FPP and FPR. Fifth, researchers should not draw any conclusions based on significance tests in exploratory analyses. Effects should be gauged using other measures of statistical importance or alternatively alpha levels should be set at a very conservative level.

Researchers who wish to go against these recommendations for theoretical or other reasons are advised to show by simulation that their analysis does not have an inflated risk of generating false-positive results or if finding that it does have a higher risk, adjusting the alpha level to mitigate the issue. In general, we believe it would be useful always to supplement power analyses with Type I error analyses similar to the ones reported here. The theoretical assumption in power analysis is that Type I error rates are determined by the alpha level, but our findings show that this is often not the case.

Author contributions

JDC and JLO developed the study concept. JDC and SP performed the analyses. JDC, SP, CJL, and JLO wrote the manuscript.

Data availability

All code for simulation and figures in the paper can be found at <https://osf.io/tcpx4/>.

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Appendix

Binomial coefficient

In the following sections we present the equations and methods used for calculating the model set sizes for different model sets under different conditions. To calculate the size of the different model sets, we use binomial coefficients to calculate the number of possible combinations. The general form of the binomial coefficient is written as

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

where n is the number of elements which in our case is the number of covariates (z) that we want to include, and k is the number of elements taken out. $!$ is the factorial operator, so $n! = n \times (n-1) \times (n-2) \times (n-3) \times \cdots \times 3 \times 2 \times 1$. The binomial coefficient therefore gives us the number of ways that k elements can be chosen from a set of size n . One rule that has been repeatedly used is that we can rewrite the sum of binomial coefficients excluding the empty set i.e., not including $i = 0$, as

$$\sum_{i=1}^n \binom{n}{i} = 2^n - 1$$

If we include the empty set this becomes

$$\sum_{i=0}^n \binom{n}{i} = 2^n$$

When calculating the size of each model set, we consider two different cases; a case without restrictions where we allow interactions without the corresponding main effects, and a case with restrictions where main effects always follow interactions. This means that the second case will be a subset of the first case.

Model sets without restrictions

Set $x + z$. To calculate the size of the sets, we use the binomial coefficient. The set $x + z$ contains all the combinations that can be made by the covariates z including the model where there is only the variable of interest x . Based on the previous terminology the model containing only the variable of interest is therefore the empty set and the binomial coefficient therefore computes how many combinations there are. Let us denote the number of covariates n . If we, for example, have three covariates ($n = 3$), then the number of combinations where all three covariates are present can be written using the binomial coefficient as

$$\binom{3}{3} = \frac{3!}{3!(3-3)!} = 1$$

If only two covariates are included in the model from the set of three possible covariates, then the number of combinations becomes

$$\binom{3}{2} = \frac{3!}{2!(3-2)!} = 3$$

And the same if only one covariate is present

$$\binom{3}{1} = \frac{3!}{1!(3-1)!} = 3$$

Finally, where no covariates are present, the number of possible combinations is computed as follows

$$\binom{3}{0} = \frac{3!}{0!(3-0)!} = 1$$

The total number of models in this set will then be the sum of all these

$$\# \text{ of models in } x + z = \binom{3}{3} + \binom{3}{2} + \binom{3}{1} + \binom{3}{0} = \sum_{i=0}^3 \binom{3}{i}$$

Using the rule for adding binomial coefficients, we can rewrite this into

$$\# \text{ of models in } x + z = \sum_{i=0}^3 \binom{3}{i} = (2^3) = 8$$

We can generalize this to the case with n covariates as follows

$$\# \text{ of models in } x + z = \sum_{i=0}^n \binom{n}{i} = (2^n)$$

Formally Written. Let Z be the set of covariates

$$Z = \{z_1, z_2, \dots, z_n\}$$

$$|Z| = n$$

The $x + z$ set is then the power set of Z

$$x + z = \{S : S \subseteq Z\}$$

Each element $S \in x + z$ is a set of the covariates e.g., $S = z_3, z_7$, or any combination of the covariates, including the empty set. This is just the power set of Z and the size of the set can be written as

$$|x + z| = |\mathcal{P}(Z)| = 2^n$$

Set $x \times z$. The same line of reasoning goes for the $x \times z$ set as for $x + z$ set and we therefore only write it formally. Here, we need to calculate the number of possible interactions between the variable of interest and covariates. This set will therefore have the same size as the $x + z$ set, as there are as many covariates as there are two-way combinations between the variable of interest and covariates excluding the empty set.

$$I_h(Z) = \{\{x, z_i\} : z_i \in Z\}$$

$$x \times z = \{T : T \subseteq I_h(Z), T \neq \emptyset\}$$

The total number of models in this set is the power set excluding the empty set

$$|x \times z| = 2^n - 1$$

Set $z \times z$. The $z \times z$ set contains all combinations of all two-way interactions between the covariates. We first calculate the number of two-way interactions between the covariates and then calculate the number of combinations of these interactions. In the example where $n = 3$, the number of two-way interactions is as follows

$$\# \text{ of two-way interactions} = \binom{3}{2} = \frac{3!}{2!(3-2)!} = 3$$

We can then compute the number of combinations of two-way interaction effects using the same method as above

$$\# \text{ of models in } z \times z = \binom{3}{3} + \binom{3}{2} + \binom{3}{1} = \sum_{i=1}^3 \binom{3}{i} = 7$$

In general, we can define the number of two-way interactions h that can be generated with n covariates as

$$h = \binom{n}{2} = n(n-1)/2$$

and the general term for the total number of models in $z \times z$ as

$$\# \text{ of models in } z \times z = \sum_{i=1}^{n(n-1)/2} \binom{n(n-1)/2}{i} = (2^{n(n-1)/2} - 1) = 2^h - 1$$

Formally written. Let Z be a set of covariates $Z = \{z_1, z_2, \dots, z_n\}$

$$I_k(Z) = \{\{z_i, z_j\} : z_i \in Z, z_j \in Z, z_i \neq z_j\}$$

$$|I_k(Z)| = \binom{n}{2} = \frac{n(n-1)(n-2)!}{(n-2)!} \frac{1}{2} = n(n-1)/2$$

The set of all combinations of two-way interactions between the covariates is then all the subsets of $I_k(Z)$ excluding the empty set

$$P(I_k(Z)) = \{J : J \subseteq I_k(Z), J \neq \emptyset\}$$

$$|z \times z| = |P(I_k(Z))| = 2^{|I_k(Z)|} - 1 = 2^{n(n-1)/2} - 1$$

defining

$$h = \binom{n}{2} = n(n-1)/2$$

We can write the number of models in $z \times z$ as

$$|z \times z| = 2^h - 1$$

Full model set. For the following sets: $x + z + x \times z$, $x + z + z \times z$, and $x + z + x \times z + z \times z$, the equations follow directly from the previous equations as these sets are the products of the previously calculated sets.

$$\#of\ models\ in\ x + z = (2^n)$$

$$\#of\ models\ in\ x \times z = (2^n - 1)$$

$$\#of\ models\ in\ z \times z = (2^h - 1)$$

$$\#of\ models\ in\ x + z + x \times z = (2^n - 1)^2$$

$$\#of\ models\ in\ x + z + z \times z = (2^n - 1)(2^h - 1)$$

$$\#of\ models\ in\ x + z + x \times z + z \times z = (2^n - 1)^2(2^h - 1)$$

So the total number of models including all sets then becomes

total # of models =

$$\begin{aligned} & \underbrace{(2^n)}_{x+z} + \underbrace{(2^n - 1)}_{x \times z} + \underbrace{(2^h - 1)}_{z \times z} + \\ & \underbrace{(2^n - 1)^2}_{x+z+x \times z} + \underbrace{(2^n - 1)(2^h - 1)}_{x \times z + z \times z} + \underbrace{(2^n - 1)(2^h - 1)}_{x+z+z \times z} + \\ & \underbrace{(2^n - 1)^2(2^h - 1)}_{x+z+x \times z + z \times z} \end{aligned}$$

Model sets with restrictions

In the case with restrictions, we enforce that every time there is an interaction effect, the corresponding main effects are included in the model as in the model below:

$$y = x_1 + z_1 + x_1 z_1$$

In the previous equation, we have an interaction between our variable of interest x_1 and a covariate z_1 . Therefore, the two corresponding main effects also enter the model. This restriction does not change how we calculate the set size of the $x + z$ set as there are no

interactions in it. On the other hand, the restriction implies that the sets $x \times z$ and $z \times z$ are empty sets as the models in these sets never have main effects following interactions. The first set we then need to calculate is then the set $x + z + x \times z$.

Set $x + z + x \times z$. For the sake of simplicity, we begin with the case where $n = 3$. The models in this set can be seen in Table A1. Here the models are split into three different parts. These are split such that $x + z + x \times z(1)$, $x + z + x \times z(2)$, and $x + z + x \times z(3)$ contain all the models where there are one, two, or three covariates, respectively.

Table A1

Example of division of the $x + z + x \times z$ set into three subsets when there are three covariates and one dependent variable. $x + z + x \times z(1)$ contains all the models with one covariate as main effect, $x + z + x \times z(2)$ all the models with two covariates, and $x + z + x \times z(3)$ all the models with three covariates

Set	Models
$x + z + x \times z(1)$	$y = x_1 + z_1 + x_1 z_1$
	$y = x_1 + z_2 + x_1 z_2$
	$y = x_1 + z_3 + x_1 z_3$
$x + z + x \times z(2)$	$y = x_1 + z_1 + z_2 + x_1 z_1$
	$y = x_1 + z_1 + z_3 + x_1 z_1$
	$y = x_1 + z_3 + z_1 + x_1 z_3$
	$y = x_1 + z_3 + z_2 + x_1 z_3$
	$y = x_1 + z_2 + z_1 + x_1 z_2$
	$y = x_1 + z_2 + z_3 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + x_1 z_1 + x_1 z_2$
	$y = x_1 + z_1 + z_3 + x_1 z_1 + x_1 z_3$
	$y = x_1 + z_1 + z_2 + x_1 z_3 + x_1 z_2$
$x + z + x \times z(3)$	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_3$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1 + x_1 z_3$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_3 + x_1 z_2$
	$y = x_1 + z_1 + z_2 + z_3 + x_1 z_1 + x_1 z_2 + x_1 z_3$

To calculate the size of each of these sets separately, we only need to focus on the number of covariates that enter the model, as per assumption the variable of interest x_1 is

always present. Let us start with the $x + z + x \times z(1)$ set. In this set, there can only be one covariate present at the time; there are therefore three combinations, which can be written as $\binom{3}{1}$. In this set, since there is only one covariate, there is only one interaction effect containing that same covariate. As no other combinations can be made, this corresponds to $\binom{1}{1}$. Using the same shorthand notation with the binomial coefficient as above, we can write the number of models in the $x + z + x \times z(1)$ set as

$$\# \text{ of models in } x + z + x \times z(1) = \binom{1}{1} \binom{3}{1} = \sum_{i=1}^1 \binom{1}{i} \binom{3}{1} = (2^1 - 1) \binom{3}{1} = 3$$

Using this notation is useful when we later have to combine the three sets of $x + z + x \times z$ into one to calculate the total number of models in $x + z + x \times z$.

For the $x + z + x \times z(2)$ set, we first need to calculate the number of combinations for the main effect that can be made when there are two covariates present at all times and that is $\binom{3}{2}$. Next we need to calculate the number of combinations of interactions that can be present. As we have two covariates present all the time, these are the ones that can be used in the interaction effects. Since the covariates interact with x_1 , there can either be one or two interaction effects present. Hence, we have $\binom{2}{1}$ and $\binom{2}{2}$ combinations of the interaction effects possible. Combining the number of covariates with the number of possible interactions we get

$$\begin{aligned} \# \text{ of models in } x + z + x \times z(2) = & \binom{2}{1} \binom{3}{2} + \binom{2}{2} \binom{3}{2} = \\ & \sum_{i=1}^2 \binom{2}{i} \binom{3}{2} = (2^2 - 1) \binom{3}{2} = 9 \end{aligned}$$

The same reasoning goes for the $x + z + x \times z(3)$ set; the only difference here is that we have one more covariate. So if we write the combinations that are possible with three covariates in the same way as before, we get

$$\begin{aligned} \# \text{ of models in } x + z + x \times z(3) &= \\ &= \binom{3}{1} \binom{3}{3} + \binom{3}{2} \binom{3}{3} + \binom{3}{3} \binom{3}{3} = \\ &= \sum_{i=1}^3 \binom{2}{i} \binom{3}{2} = \\ &= (2^3 - 1) \binom{3}{3} = 7 \end{aligned}$$

We can then sum all three sets that is, $x + z + x \times z(1)$, $x + z + x \times z(2)$, and $x + z + x \times z(3)$, to get the size of the $x + z + x \times z$ set

$$\# \text{ of models in } x + z + x \times z = \sum_{k=1}^3 (2^k - 1) \binom{3}{k}$$

where k is the number of covariates that enter as main effects, meaning it is an indicator for $x + z + x \times z(1)$, $x + z + x \times z(2)$ and $x + z + x \times z(3)$. For the case with n covariates, this becomes

$$\# \text{ of models in } x + z + x \times z = \sum_{k=1}^n (2^k - 1) \binom{n}{k}$$

Formally written. Let Z be a set of covariates

$$Z = \{z_1, z_2, \dots, z_n\}$$

$$|Z| = n$$

Let J be a set of indicators of how many covariates enter the model set as main effects

$$J = \{1, 2, 3, 4, \dots, n\}$$

Let L be a subset of Z of size k

$$L = \{S : S \subset Z, |S| = k, k \in J\}$$

The number of interactions that can be made between a covariate and the variable of interest for a given k is then

$$I_h(Z) = \{\{z_i, x_1\} : z_i \in L\}$$

$$|I_h(Z)| = k$$

For each k , the number of interactions is just the power set of Z excluding the empty set

$$|\mathcal{P}(I_h(Z) : I_h(Z) \neq \emptyset)| = 2^k - 1$$

For each k , there is $\binom{n}{k}$ combinations of interactions that can be present with the number of covariates k . To get the full set, we need to sum over these combinations from $k = 1$ to n (with $k = 0$ it would not be possible to make any interactions so this one is excluded).

$$|x + z + x \times z| = \sum_{k=1}^n \binom{n}{k} (2^k - 1)$$

Set $x + z + x \times z$. Here we can use the same line of reasoning as for the $x + z + x \times z$ set. Let us begin by examining the case where $n = 3$ and then develop a more general notion. To make it easier to understand how to calculate the set size, we split this set into subsets as we did above for the $x + z + x \times z$ set. This example can be seen in Table [A2](#).

A model must always include at least two covariates to fulfil the restriction that main

Table A2

Division of the $x + z + z \times z$ set into two subsets when there are three covariates and one dependent variable. $x + z + z \times z(2)$ contains all the models with two covariates as main effects, and $x + z + z \times z(3)$ all the models with three covariates. $x + z + z \times z(1)$ is an empty set since at least two covariates are necessary to make an interaction.

Set	Models
$x + z + z \times z(2)$	$y = x_1 + z_1 + z_2 + z_1z_2$
	$y = x_1 + z_1 + z_3 + z_1z_3$
	$y = x_1 + z_2 + z_3 + z_2z_3$
$x + z + z \times z(3)$	$y = x_1 + z_1 + z_2 + z_3 + z_1z_2$
	$y = x_1 + z_1 + z_3 + z_2 + z_1z_3$
	$y = x_1 + z_2 + z_3 + z_1 + z_2z_3$
	$y = x_1 + z_1 + z_2 + z_3 + z_1z_2 + z_1z_3$
	$y = x_1 + z_1 + z_3 + z_2 + z_1z_3 + z_2z_3$
	$y = x_1 + z_2 + z_3 + z_1 + z_1z_2 + z_2z_3$
	$y = x_1 + z_1 + z_2 + z_3 + z_1z_2 + z_2z_3 + z_1z_3$

effects follow interactions effects. Therefore, we can divide the $x + z + z \times z$ set into two subsets; the first subset has two covariates present as main effects and the second subset has three covariates present as main effects. The first set, $x + z + z \times z(2)$, is the number of combinations that can be made from two out of three covariates, meaning $\binom{3}{2}$, multiplied with the combinations of the two covariates that are included, meaning $\binom{2}{2}$.

$$\# \text{ of models in } x + z + z \times z(2) = \binom{3}{2} \binom{2}{2} = 3$$

For the second subset, $x + z + z \times z(3)$, the first term is the number of combinations that can be made with three covariates so this is $\binom{3}{3}$. We then have to calculate the number of interactions that can be made with the three included covariates. To do that, first we need to calculate the number of two-way interactions that can be made with three covariates and this is $\binom{3}{2} = 3$. The total number of models in the set is then the sum of the number of

combinations

$$\# \text{ of models in } x + z + z \times z(3) = \binom{3}{3} \left(\binom{3}{1} + \binom{3}{2} + \binom{3}{3} \right) = \binom{3}{3} \sum_{i=1}^3 \binom{3}{i}$$

However, it is only in this example that we sum to $n = 3$. In general, this will be the number of pairs that can be made in this subset. The number of pairs can be written as

$$\binom{n}{2} = \frac{n(n-1)}{2}. \text{ This then becomes}$$

$$\# \text{ of models in } x + z + z \times z(3) = \binom{3}{3} \sum_{i=1}^3 \binom{3}{i} = \binom{3}{3} \sum_{i=1}^{\frac{3(3-1)}{2}} \binom{\frac{3(3-1)}{2}}{i} = \binom{3}{3} \left(2^{\frac{3(3-1)}{2}} - 1 \right)$$

We can write the first subset in the same way

$$\# \text{ of models in } x + z + z \times z(2) = \binom{3}{2} = \binom{3}{2} \left(2^{\frac{2(2-1)}{2}} - 1 \right)$$

Now we just add these two subsets up

$$\# \text{ of models in } x + z + z \times z = \binom{3}{2} \left(2^{\frac{2(2-1)}{2}} - 1 \right) + \binom{3}{3} \left(2^{\frac{3(3-1)}{2}} - 1 \right) = \sum_{j=2}^3 \binom{3}{j} \left(2^{\frac{j(j-1)}{2}} - 1 \right)$$

We can then generalize this case for n covariates

$$\# \text{ of models in } x + z + z \times z = \sum_{j=2}^n \binom{n}{j} \left(2^{\frac{j(j-1)}{2}} - 1 \right)$$

Formally written. Let Z be a set of covariates

$$Z = \{z_1, z_2, \dots, z_n\}$$

$$|Z| = n$$

Let k be an indicator of how many covariates are included. Since we are using interactions, k must begin at two. Let T be a set of indicators of the number of covariates beginning at two

$$T = \{2, 3, 4, \dots, n\}$$

Let L be a subset of Z of size k

$$L = \{S : S \subset Z, |S| = k, k \in T\}$$

The number of interactions that can be made for a given k is then

$$I_k(Z) = \{\{z_i, z_j\} : z_i \in L, z_j \in L, z_i \neq z_j\}$$

For a given k , the number of two-way interactions that can be made is then

$$|I_k(Z)| = \binom{k}{2} = \frac{k!}{2!(k-2)!} = \frac{k(k-1)(k-2)!}{(k-2)!} \frac{1}{2} = \frac{k(k-1)}{2}$$

We then need the combinations of all the two-way interactions. For all k , we can take the power set of $I_k(H)$ excluding the empty set

$$P(I_k(Z)) = \{T : T \subset I_k(Z), T \neq \emptyset\}$$

$$|P(I_k(Z))| = 2^{|I_k(Z)|} - 1 = 2^{\frac{k(k-1)}{2}} - 1$$

With n covariates, there exist $\binom{n}{k}$ subsets of size k . To get the $x + z + z \times z$ set, we need

to sum over the number of covariates k starting from $k = 2$

$$|x + z + z \times z| = \sum_{k=2}^n \binom{n}{k} \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Set $x + z + x \times z + z \times z$. This set is the product of the $x + z + x \times z$ and $x + z + z \times z$ sets, but without including the main effect twice. Hence, the set consists of the combinations that can be made between the variable of interest and the covariates and between the covariates alone. We can therefore write

$$\# \text{ of models in } x + z + x \times z + z \times z = \sum_{k=2}^n \binom{n}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Formally written. The design of the subsets is the same as earlier and we need to take the product of $P(I_k(Z))$ and $P(I_h(Z))$, as defined above, and sum over k beginning at two. For n covariates, there exists $\binom{n}{k}$ subsets of size k . We then need to sum the subsets as follows

$$|x + z + x \times z + z \times z| = \sum_{k=2}^n \binom{n}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1 \right)$$

Full model set with restrictions

We now have the full set of models in the n covariate case written as

$$\begin{aligned} \# \text{ models} = & \underbrace{(2^n)}_{x+z} + \underbrace{\sum_{k=1}^n (2^k - 1) \binom{n}{k}}_{x+z+x \times z} + \\ & \underbrace{\sum_{k=2}^n \binom{n}{j} \left(2^{\frac{k(k-1)}{2}} - 1 \right)}_{x+z+z \times z} + \\ & \underbrace{\sum_{k=2}^n \binom{n}{k} (2^k - 1) \left(2^{\frac{k(k-1)}{2}} - 1 \right)}_{x+z+x \times z + z \times z} \end{aligned} \tag{2}$$

Correlation matrix for simulation

The following correlation matrix is used for the simulating data with one dependent variable.

Table A3
Correlation matrix for the simulated data when having only one dependent variable. r denotes the different correlations set between the covariates and dependent variable in the simulation

	y	x_1	z_1	z_2	z_3	...	z_n
y	1						
x_1	0	1					
z_1	r	0	1				
z_2	r	0	0	1			
z_3	r	0	0	0	1		
...	r	0	0	0	0	1	
z_n	r	0	0	0	0	0	1

Supporting figures

In this section, there are two additional figures illustrating the consequences of using several dependent variables and what happens if the correlation between the dependent variable and covariates increases. Figure A1 shows the effect of using two dependent variables and the average of the two (a total of three dependent variables). Everything else is similar to the baseline model meaning that the sample size is 200, there are two covariates, no outlier deletion, and the correlation between the dependent variable and covariates is $r = 0.2$.

Figure A2 shows the effect of increasing the correlation between the dependent variable and covariates. Here the increase goes from $r = 0.2$ to $r = 0.3$ and $r = 0.4$. Everything else is similar to the baseline model.

Figure A1. False-positive probability and false-positive ratio when using two dependent variables and the average of the two (three dependent variables in total). The correlation between the dependent variables is set to $r = 0.5$ with the correlation between the dependent variables and covariates still at $r = 0.2$. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure 1.

Figure A2. False-positive probability and false-positive ratio for different levels of correlation between the dependent variable and the covariates ranging from $r = 0.2$ to $r = 0.4$. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure 1.

Supplementary Information

In the article "Preregistration is important, but not enough", we examine the consequences of two different cases of the data structure; where both the variable of interest x and covariates z have the same distribution i.e., both binary or both normally distributed. However, there are also the cases where one is binary and the other is normally distributed. The result for these cases can be found in this *Supplementary Information* in the section "Results without correcting p-values". The first figure, S1, contains the baseline model. This is the figure that all the other figures are compared to to see the increase of the false-positive probability (FPP) or false-positive ratio (FPR) for any of the flexibilities investigated. For this figure, the sample size is set to 200, the correlation between the dependent variable and covariates is $r = 0.2$, two covariates are used, and no outlier criteria are used. For each of the figures in this section, one of these flexibilities is changed. Figure S2 illustrates the consequences of an increase in the correlation between the dependent variable and covariates, Figure S3 illustrates what happens when using an additional dependent variable and the average between these two, Figure S4 illustrates the consequences of using several outlier criteria, Figure S5 illustrates the increase in the FPP and FPR when using three instead of two covariates and finally Figure S6 shows what happens to the FPP and FPR when increasing the sample size.

In the second part of this *Supplementary Information*, in the section "Results when using Bonferroni correction of p-values", is the same set of figures, but in this case the critical value has been corrected using Bonferroni correction. The figures follow the same order as the first section; presented first is a baseline model with Bonferroni correction in Figure S7 and afterwards the effect of changing one of the flexibilities in Figure S8 to Figure S12.

In the final part of the *Supplementary Information*, in the section "Overview tables", full tables of all the results from the simulation can be found. Here are results both with and without Bonferroni correction.

Results without correcting p-values

The following supporting figures (*S1 – S6*) show additional conditions that influence the FPP and FPR when p-values are not corrected.

Figure S1. The false-positive probability and false-positive ratio given different model sets, the presence of main effects when having interactions (i.e., Without restrictions or With restrictions) and different distributions of the variable of interest and covariates. The figure includes the two other cases compared to the main article i.e., when the variable of interest is binary and the covariates are continuous and the other way around. Sample size is set to 200, a correlation between the dependent variable and covariates is $r = 0.2$, no outlier criteria is used, and there are two covariates. The false-positive probability is shown in black and the false-positive ratio in red. Dashed blacked line shows the critical value, here set at 0.05. This figure adds the two other cases not shown in Figure 1.

Figure S2. False-positive probability and false-positive ratio for different levels of correlation between the dependent variable and covariates ranging from $r = 0.2$ to $r = 0.4$. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed black line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S1.

Figure S3. False-positive probability and false-positive ratio when using two dependent variables and the average of the two (three dependent variables in total). The correlation between the dependent variables is set to $r = 0.5$ with the correlation between the dependent variables and covariates still at $r = 0.2$. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S1.

Figure S4. False-positive probability and false-positive ratio when using multiple outlier criteria. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. Otherwise, the description of the figure is the same as for Figure S1.

Figure S5. False-positive probability and false-positive ratio when using three covariates instead of two as in the base line model. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. This figure adds the two other cases not shown in Figure 2. Otherwise, the description of the figure is the same as for Figure S1.

Figure S6. Effect of increasing sample size for each model set and all combinations of data distributions (i.e., binary and normal). Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed black line shows the critical value, here set at 0.05. This figure adds the two other cases not shown in Figure 3. Otherwise, the description of the figure is the same as for Figure S1.

Results when using Bonferroni correction of p-values

In this section, we present the same analyses, but with Bonferroni correction of p-values. This means that the critical value (α) now has a correction such that $\alpha = 0.05/\text{Number of tests in each model}$. So the critical value will only be 0.05 in the case where there are no interactions between the variable of interest and covariates. The critical value is corrected for each test such that it can differ within each model set depending on how many interactions there are per model.

Figure S7. The description of this figure is the same as for Figure S1 with the only difference being that we applied Bonferroni correction. This figure therefore shows the false-positive probability and false-positive ratio given different model sets, the presence of main effects when having interactions (i.e., Without restrictions or With restrictions), and different distributions of the variable of interest and covariates. Sample size is set to 200, a correlation between the dependent variable and covariates is $r = 0.2$, no outlier criteria is used, and there are two covariates. The false-positive probability is shown in black and false-positive ratio in red. Dashed blacked line shows the critical value, here set at 0.05.

Figure S8. False-positive probability and false-positive ratio for different levels of correlation between the dependent variable and covariates ranging from $r = 0.2$ to $r = 0.4$ when using Bonferroni correction. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed black line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S7.

Figure S9. False-positive probability and false-positive ratio when using two dependent variables and the average of the two (three dependent variables in total) when using Bonferroni correction. The correlation between the dependent variables is set to $r = 0.5$ with the correlation between the dependent variables and covariates still at $r = 0.2$. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S7.

Figure S10. False-positive probability and false-positive ratio when using multiple outlier criteria and Bonferroni correction. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed blacked line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S7.

Figure S11. False-positive probability and false-positive ratio when using three covariates instead of two as in the baseline model and when using Bonferroni correction. Black denotes the the false-positive probability and red denotes the false-positive ratio. Dashed black line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S7.

Figure S12. Effect of increasing sample size for each model set and all combinations of data distributions (i.e., binary and normal) when using Bonferroni correction. Black denotes the false-positive probability and red denotes the false-positive ratio. Dashed black line shows the critical value, here set at 0.05. The description of the figure is otherwise the same as for Figure S1.

Overview tables

Readers interested in examining specific results from the simulation can consult the following overview tables. Table [S1](#) and Table [S2](#) contain the results for the full simulation of the different sets. Table [S1](#) contains all the results when there is no correction of the p-value and [S2](#) contains the results when Bonferroni correction is used. For each set, the result of the false-positive probability (FPP) and false-positive ratio (FPR) is shown with and without the restriction that main effects should always follow an interaction and for the different flexibilities used in the article i.e., increasing the number of covariates, increasing the number of dependent variables, and using several outlier criteria. This is shown using different data structures for the variable of interest and covariates.

Table S1

False-positive probability (FPP) and False-positive ratio (FPR) for the different model sets

Restrictions	Set	Type	Sample Size	Outlier exclusion	Correlation	Covariates	Dependent variables	FPP	FPR
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05

<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.06	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.17	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.24	0.14
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.82	0.64
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.94	0.72
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.79	0.62
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.91	0.69
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.25	0.12

<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.18	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.38	0.25
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.35	0.24
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.17	0.09
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.17	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.58	0.40
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.54	0.38
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.18	0.13
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.71	0.53
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.69	0.51
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.17	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.89	0.72
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.87	0.70
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.17	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.93	0.79
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.92	0.77
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.19	0.14
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.99	0.91
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.98	0.90
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.22	0.15
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.99
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.99
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.34	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.87	0.61

<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.86	0.55
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.31	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.17	0.12
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.24	0.14
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.82	0.64
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.94	0.72
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.79	0.62
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.91	0.69
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.17	0.10
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.25	0.12
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.06	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.06	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.05	0.05

<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.09	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.09	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.10	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.06	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.06	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.07	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.23	0.12
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.37	0.14

<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.86	0.39
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.97	0.46
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.83	0.39
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.95	0.46
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.23	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.37	0.11
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.24	0.11
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.47	0.17
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.44	0.18
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.23	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.24	0.11
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.65	0.25
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.60	0.25
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.22	0.09
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.24	0.12
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.78	0.33
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.73	0.32
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.22	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.24	0.12
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.92	0.44
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.90	0.44
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.22	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.23	0.12
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.96	0.48
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.94	0.48
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.22	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.28	0.12
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	1.00	0.57
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.99	0.57
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.25	0.10

<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.35	0.13
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.62
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.62
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.29	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.41	0.11
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.92	0.37
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.90	0.35
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.38	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.23	0.12
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.37	0.14
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.87	0.39
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.97	0.46
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.83	0.39
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.95	0.46
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.23	0.10
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.37	0.11
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.06	0.05

Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.06	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.06	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.06	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.06	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.06	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.09	0.08
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.08	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.14	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.10	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
Without	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.09	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.06	0.05
Without	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.09	0.05

<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.06	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.09	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.19	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.30	0.13
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.36	0.13
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.93	0.30
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.79	0.33
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.93	0.61
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.35	0.11
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.19	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.24	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.36	0.14
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.19	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.28	0.10
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.53	0.21
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.19	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.33	0.12
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.69	0.28
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.20	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.19	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.40	0.14
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.87	0.37
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.19	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.45	0.16

<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.92	0.41
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.22	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.56	0.20
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.98	0.47
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.21	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.26	0.10
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.79	0.29
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.52
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.22	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.36	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.47	0.12
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.86	0.30
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.35	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.19	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.30	0.13
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.36	0.13
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.93	0.30
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.79	0.33
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.93	0.61
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.35	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.22	0.12
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.42	0.13
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.50	0.17
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.96	0.23
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.82	0.31
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.96	0.42
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.20	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.39	0.11

<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.23	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.31	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.41	0.15
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.21	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.23	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.38	0.14
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.57	0.21
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.20	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.22	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.44	0.15
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.71	0.26
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.21	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.22	0.12
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.56	0.19
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.89	0.35
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.20	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.22	0.12
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.61	0.21
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.93	0.38
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.20	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.27	0.12
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.77	0.28
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.99	0.45
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.22	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.32	0.13
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.95	0.40
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.50
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.25	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.41	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.62	0.17

<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.89	0.27
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.34	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.22	0.12
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.42	0.13
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.50	0.17
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.96	0.23
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.82	0.31
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.96	0.42
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.20	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.39	0.11
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.06	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.06	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05

<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.06	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.29	0.12

<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.31	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.28	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.31	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.19	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.19	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.18	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.18	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.18	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.18	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.19	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.20	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.20	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.20	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.20	0.09

<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.22	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.21	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.22	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.22	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.35	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.29	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.31	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.33	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.29	0.12
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.31	0.10
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.18	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.28	0.11
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.19	0.09
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.31	0.10
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.05	0.05

<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.10	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.09	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.10	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.08	0.05

<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.05	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.08	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.29	0.13
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.32	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.28	0.13
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.32	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.17	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.16	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	50	FALSE	0.20	2.00	1.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	50	FALSE	0.20	2.00	1.00	0.17	0.09
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.16	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.16	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.15	0.12
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.16	0.10

<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.16	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.16	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.16	0.09
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.16	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.15	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.16	0.09
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.31	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.25	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.27	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.30	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.16	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.29	0.13
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.32	0.11
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.15	0.12
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	3.00	0.28	0.13
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.17	0.10
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	3.00	0.32	0.11

Table S2

False-positive probability (FPP) and false-positive ratio (FPR) for the different model sets when using Bonferroni correction

Restrictions	Set	Type	Sample Size	Outlier exclusion	Correlation	Covariates	Dependent variables	FPP	FPR
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.06	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.07	0.05

<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>Without</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>Without</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.17	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.69	0.27
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.85	0.30
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.67	0.26
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.81	0.28
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.18	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.43	0.16
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.39	0.14
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.58	0.22
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.55	0.20
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.13	0.05

<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.79	0.32
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.77	0.31
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.13	0.06
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.86	0.36
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.84	0.35
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.15	0.06
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.97	0.45
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.96	0.45
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.14	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.18	0.06
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.52
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.52
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.15	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.25	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.77	0.26
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.75	0.22
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.24	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.24	0.05
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.88	0.29
<i>Without</i>	$x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.86	0.28
<i>Without</i>	$x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.24	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.09	0.05

<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.08	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.14	0.05

<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>Without</i>	$z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.23	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.75	0.24
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.90	0.30
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.71	0.23
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.87	0.29
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.15	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.24	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.49	0.13
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.45	0.13
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.16	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.63	0.18
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.60	0.18
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.15	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.83	0.28
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.81	0.27
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.15	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.89	0.32
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.87	0.31
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.15	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.19	0.06
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.98	0.41

<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.98	0.41
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.18	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.23	0.06
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.49
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.49
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.20	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.29	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.82	0.22
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.81	0.20
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.28	0.04
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.28	0.05
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.92	0.26
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.90	0.25
<i>Without</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.28	0.04
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05

<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.09	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.10	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.15	0.05
<i>Without</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.19	0.06
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.24	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.84	0.19
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.66	0.25
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.84	0.45

<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.21	0.04
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.18	0.06
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.39	0.14
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.20	0.07
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.54	0.20
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.26	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.76	0.31
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.12	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.29	0.10
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.83	0.35
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.13	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.15	0.06
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.40	0.14
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.96	0.44
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.14	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.18	0.06
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.64	0.23
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.51
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.15	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.25	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.33	0.08
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.75	0.22
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.24	0.05

<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.23	0.05
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.41	0.09
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.85	0.28
<i>Without</i>	$x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.24	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.25	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.36	0.08
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.89	0.13
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.69	0.16
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.90	0.27
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.25	0.04
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.25	0.06
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.42	0.10
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.15	0.04
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.31	0.07
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.56	0.13
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.41	0.09
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.78	0.20
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.14	0.04
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.14	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.46	0.11
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.86	0.22
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.15	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.18	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.63	0.15

<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.97	0.30
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.16	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.23	0.06
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.90	0.25
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	1.00	0.36
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.18	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.28	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.47	0.08
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.79	0.15
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.27	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.27	0.05
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.58	0.09
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.88	0.18
<i>Without</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.27	0.04
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.07	0.05

<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.06	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.07	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.08	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>With</i>	$x + z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.16	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.18	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.16	0.05

<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.18	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.14	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.14	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.14	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.16	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.14	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.16	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.24	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.21	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.22	0.05
<i>With</i>	$x + z + x \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.24	0.05

[illegible]

<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.08	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.09	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.14	0.05
<i>With</i>	$x + z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.19	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.21	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	3.00	1.00	0.18	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	3.00	1.00	0.21	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	100	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	100	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	150	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	150	FALSE	0.20	2.00	1.00	0.13	0.05

<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	250	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	250	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	300	FALSE	0.20	2.00	1.00	0.11	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	300	FALSE	0.20	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.12	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.30	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.30	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.15	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.40	2.00	1.00	0.13	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.40	2.00	1.00	0.15	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.24	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.21	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	TRUE	0.20	2.00	1.00	0.20	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	TRUE	0.20	2.00	1.00	0.24	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.22	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.24	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Normal}, z \sim \text{Binary}$	200	FALSE	0.20	2.00	3.00	0.22	0.05
<i>With</i>	$x + z + x \times z + z \times z$	$x \sim \text{Binary}, z \sim \text{Normal}$	200	FALSE	0.20	2.00	3.00	0.24	0.05